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OCCLUSAL CHARACTERISTICS IN PRIMARY DENTITION OF PRESCHOOL CHILDREN OF NAVI MUMBAI: A OBSERVATIONAL CROSS SECTIONAL STUDY

Paediatric Dentistry

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ABSTRACT

Background: The occlusal characteristics vary among different populations and ethnic groups. Any deviations in occlusion in primary dentition would be carried to succeeding permanent dentition and to a more pronounced degree. Therefore, it is important to know the occlusion in primary dentition as it helps to predict the occlusion in permanent dentition. **Aim:** To assess the occlusal characteristics of primary dentition and difference in various parameters in children between 3 to 5 years of age. **Methods and Material:** Each child was examined with teeth in centric occlusion with the aid of mouth mirror and probe in natural light by a single examiner. Frequency distribution was done with Chi square test using SPSS 21 software. **Results:** Mesial step was the most prevalent molar relationship. It was seen in 57.5% of subjects on right side and 53.5% on left side. Percentage distribution of canine relationship was 70.3% and 89.0% in Class I and Class II respectively. 56.5% of children had normal overbite, 24.0% had increased overbite, 15.3% had edge-to-edge bite and 4.3% had open bite. The prevalence of normal overbite was observed in 56.5% of population. **Conclusions:** Early detection of any dental abnormalities will help us provide a more comprehensive treatment to the child.

KEYWORDS

occlusion, primary dentition, occlusal relationship, canine relationship, over bite, spacing, primate space, physiologic space.

INTRODUCTION

An ideal primary dentition is an indicator of potentially perfect permanent dentition. The transition of primary dentition to permanent dentition undergoes in different stages. Recognizing and intercepting even minor abnormalities as early as visible may help in providing a more favorable permanent dentition. Functions of the primary dentition include maintenance of the occlusion and space for the permanent dentition in addition to mastication. [1]

Understanding the association between morphologic aspects of primary dentition and its transition to the permanent dentition provides the possibility of predicting the final permanent occlusion. However, the occlusal pattern does not remain constant during growth period. It presents both beneficial changes and changes that predispose development of a malocclusion. [2]

Analysis of the occlusion in the primary dentition should consider the arrangement of deciduous teeth and the occlusal relationship of the anterior and posterior segments of both arches. The recognition of normal occlusion patterns in primary dentition as well as the identification of morphologic changes during permanent teeth eruption is essential for treatment planning in pediatric dentistry [3]

The occlusal characteristics vary among different populations and ethnic groups as discussed by different studies. [4-9] The purpose of the study was to assess the occlusal characteristics of primary dentition in the age group of 3 to 5 years and also to evaluate various parameters including terminal molar relation, primary canine relation, overbite, overjet, anterior crossbite, posterior crossbite and spacing .

METHODS:

Ethical clearance was obtained from Institutional Review Board of Ethics. The children were randomly selected from schools of Navi Mumbai. Based on the results of the pilot study, 95% confidence level and 5% allowable error, sample size was calculated and determined to be 400. Children in the age group of 3 to 5 years were selected in which 216 were males and 184 were females.

Inclusion criteria were co-operative child with complete primary dentition and without extensive dental caries. Exclusion criteria included mentally challenged or medically compromised children, congenitally or clinically missing teeth and teeth with extensive caries affecting the mesiodistal or occlusogingival dimension of the teeth. Each child was examined by a single examiner with teeth in centric occlusion with the aid of mouth mirror and probe in natural light.

The children were examined for the following arch characteristics with this evaluation criteria :

1.Terminal plane relationship of the second primary molars: [10] [Figure 1]

Flush terminal:

The distal surfaces of the upper and lower second primary molars in the same vertical plane in centric occlusion.

Distal step:

The distal surfaces of the lower primary second molar in posterior relationship to the distal surface of the upper second molars in centric occlusion.

Mesial step:

The distal surfaces of the lower primary second molar in anterior relationship to the distal surface of the upper second molars in centric occlusion.

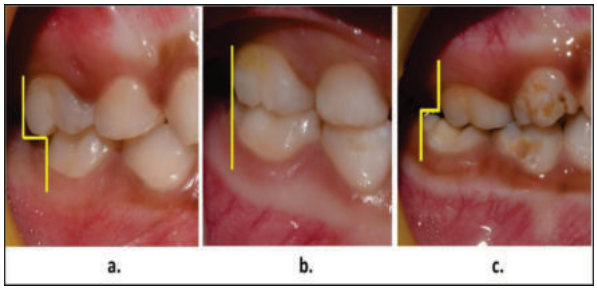

Figure 1: Terminal plane relationship (a) Mesial step (b) Flush terminal (c) Distal step

2 Primary canine relationship: [10] [Figure 2]

Class I:

The tip of the maxillary primary canine tooth is in the same vertical plane as the distal surface of the mandibular primary canine.

Class II:

The tip of the maxillary primary canine tooth is mesial to the distal surface of the mandibular primary canine.

Class III:
The tip of the maxillary primary canine is distal to the distal surface of the mandibular primary canine.

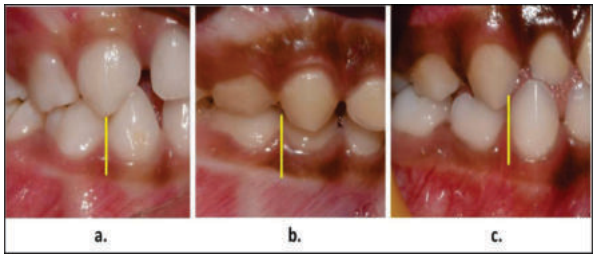

Figure 2 – Canine Relationship (a) Class I (b) Class II (c) Class III

3.Overbite [10]-
It was graded according to coverage of the mandibular incisor by the most protruded fully erupted maxillary incisor.

Normal:
Coverage of up to half of the mandibular incisor by the maxillary incisor.
.

Increased overbite:
Coverage of more than half of the mandibular incisor by the maxillary incisor.

Edge-to-edge

Anterior open bite:
Negative overlap of incisors in the vertical plane.

4. Overjet [11] -
It was measured from the palatal surface of the most protruded fully erupted maxillary incisor to the labial surface of the corresponding mandibular incisor with Williams graduated probe. Degree of overjet was recorded in millimeters.

5. Anterior crossbite [10] -
It was recorded when one or more of the maxillary incisors occluded lingual to the mandibular incisors.

6. Posterior crossbite [10] -
It was recorded when one or more of the maxillary primary canines or molars occluded lingual to the buccal cusps of the opposing mandibular teeth. [Figure 3]

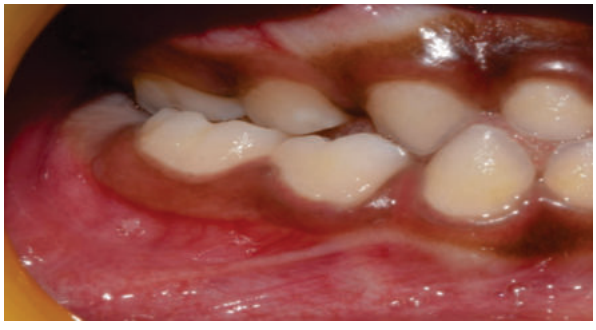

Figure 3 – Posterior cross bite

7. Spacing [12] -
Primate spaces are the most marked spaces present mesial to canines in the maxilla and distal to canines in the mandible.

Physiological spaces are the secondary or developmental spaces which are commonly found between the incisors.

After obtaining the data it was subjected to statistical analysis using SPSS software. Test used was Chi Square test.

RESULTS:
Results obtained were tabulated as follows:
Percentage distribution of terminal molar relationship showed mesial step in 57.5% of subjects on right side and 53.5% on left side. The flush terminal molar relation was seen in 40.3% on right side and 44.0% on left side. Distal step was seen in 2.3% on right and 2.5% on left side. The age wise changes in terminal molar relationship were not significant. [Table. 1]

Table 1 – Age Wise Changes In Terminal Molar Relationship

Terminal Molar Relation							
Age	Flush terminal (%)		Mesial step (%)		Distal step (%)		Total (%)
	Right	Left	Right	Left	Right	Left	
3 years	47 (39.5)	58 (48.7)	68 (57.1)	56 (47.1)	4 (3.4)	5 (4.2)	238 (100)
4 years	80 (42.6)	76 (40.4)	106 (56.4)	111 (59.0)	2 (1.1)	1 (0.5)	376 (100)
5 years	34 (36.6)	42 (45.2)	56 (60.2)	47 (50.5)	3 (3.2)	4 (4.3)	186 (100)
Total	161 (40.3)	176 (44.0)	230 (57.5)	214 (53.5)	9 (2.3)	10 (2.5)	800 (100)

For right side: $\chi 2 = 2.964$, $p = 0.564$ (not significant);
For left side: $\chi 2 = 8.835$, $p = 0.065$ (not significant)

Mesial step molar relationship was the most prevalent relationship observed in the study population.

The percentage distribution of canine relation was Class I in 70.3%, Class II in 16.5% and Class III in 4.0% in right side. On the left side the percentage distribution was class I in 89.0%, class II in 7.1% and class III in 4.0%. The change in age wise distribution of canine relation was not statistically significant. [Table 2]

Table 2 – Change In Age Wise Distribution Of Canine Relation

Canine Relation							
Age	Class I (%)		Mesial step (%)		Distal step (%)		Total (%)
	Right	Left	Right	Left	Right	Left	
3 years	89 (74.8)	78 (65.5)	16 (13.4)	25 (21.0)	14 (11.8)	16 (13.4)	238 (100)
4 years	131 (69.7)	132 (70.2)	33 (17.6)	26 (13.8)	24 (12.8)	30 (16.0)	376 (100)
5 years	61 (65.6)	66 (71.0)	17 (18.3)	15 (16.1)	15 (16.1)	12 (12.9)	186 (100)
Total	281 (70.3)	276 (69.0)	66 (16.5)	66 (16.5)	52 (13.3)	58 (14.5)	800 (100)

For right side: $\chi 2 = 2.436$, $p = 0.656$ (not significant)
For left side: $\chi 2 = 3.114$, $p = 0.539$ (not significant)

The overbite was statistically analyzed and it was observed that 56.5% had normal overbite, 24.0% had increased overbite, 15.3% had edge-to-edge bite and 4.3% had open bite. The age wise changes in degree of overbite were statistically insignificant ($\chi^2 = 7.173$, $p = 0.305$). [Table 3]

Table 3 – Age Wise Changes In Degree Of Overbite

Overbite					
Age	Normal (%)	Deepbite (%)	Edge-to-edge (%)	Open bite (%)	Total (%)
3 years	68 (57.1)	34 (28.6)	12 (10.1)	5 (4.2)	119 (100)
4 years	111 (59.0)	41 (21.8)	29 (15.4)	7 (3.7)	188 (100)
5 years	47 (50.5)	21 (22.6)	20 (21.5)	5 (5.4)	93 (100)
Total	226 (56.5)	96 (24.0)	61 (15.3)	17 (4.3)	400 (100)

$\chi 2 = 7.173$, $p = 0.305$ (not significant)

Overjet less than 2mm was seen in 61.34% of children aged 3 years, 70.21% children aged 4 years and 75.26% of children aged 5 years. Whereas overjet more than 2mm was seen in 38.65% of children aged 3 years, 29.78% children aged 4 years and 24.73% of children aged 5 years ($\chi^2 = 20.031$, $p = 0.695$).

Of the total 400 children examined, anterior crossbite was seen in 1.6% of age group of 4 years, while no cases of crossbite was observed in age groups of 3 years and 5 years. The age wise changes were not statistically significant ($\chi^2 = 3.409$, $p = 0.182$).

Posterior crossbite was noticed in 2.5%, 1.1% and 2.2% in children aged 3 years, 4 years and 5 years respectively with no statistical significance. ($\chi^2 = 2.792$, $p = 0.593$).

Maxillary spacing was present in 57.3% of samples out of which 38.25% were primate spaces and 29% were physiologic spaces. Mandibular spaces were present in 43% of samples out of which 13.75% were primate and 29.25% were physiologic ($\chi^2 = 5.638$, $p = 0.228$).

DISCUSSION:

Numerous epidemiological studies [1-14] have been carried out to document the characteristics of the primary dentition observed in various populations. These studies are important because they often reflect the need for interceptive and corrective orthodontic treatment. It is important that conditions that predispose one to develop a malocclusion of the permanent dentition be detected early in the primary dentition. The understanding of anterior and posterior changes that occur in occlusion between primary and early permanent dentition is crucial for the clinician involved in planning early interceptive treatment. [13] The most commonly observed terminal molar relation reported in other studies was flush terminal molar relation. [12,14,15] In the present study mesial step was the most common in all the three age groups. The least common distal step molar relation was seen in 2.3% of children in right side and 2.5% of children in left side. It is comparable to the study done by Bhatt SS et al which shows distal step molar relation in 2.2% of children on both right and left sides. [16]

Class I and Class II canine relation in the present study are 70.3% and 16.3% respectively which is similar to the study done by Hegde S et al which is 80% and 20% respectively. [17]

The prevalence of normal overbite was observed in 56.5% of population which is comparable with study done by Baidas L (2010) [18] which shows normal overbite in 57% of population.

In present study overjet of less than 2mm is seen in 49.75% of children whereas it is seen to be 47% in the study done by Hegde S et al. [17]

The prevalence of anterior crossbite in the present studied population is 1.6%. The prevalence of anterior crossbite in Saudi population was 1.7% and in English population 1.0%. However it is higher than the prevalence of anterior cross bite by Bhatt SS which is 0.4%. [16]

The prevalence of posterior crossbite in the present sample was 1.8%. This is higher than the earlier reported incidence of posterior crossbite by Bhatt SS which is 0.4mm. [16]

In the study done by Shriram et al anterior spacing in the mandible is the common feature. [19] Conversely, no spacing in the mandibular teeth is the common feature of the present study.

CONCLUSION:

The present study provides the prevalence of different occlusal characteristics in the Navi Mumbai population. Detection of any form of abnormalities at an early stage will help us provide a more comprehensive treatment to the child. Further longitudinal studies are required for determining the prevalence of developing malocclusion in the same population.

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