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Original Research Article

Primary canine and molar relationships in centric occlusion in 3–6-year-old children in Davanagere population: A cross-sectional survey

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ABSTRACT

Background: As a dentist, it is very important to know the occlusal relationship of primary dentition so that any malocclusion in permanent dentition can be predicted at early stages and corrected accordingly by orthodontic treatments. The ideal occlusion and spacing in primary dentition acts as a mirror for the prevalence of malocclusion in the permanent dentition.

Aim: The aim of the study was to assess the occlusal relationships between the primary canines and the primary molars and spacings in primary dentition among a group of 3-6-year-old children.

Materials and Methods: A total of 120 children, comprising of 60 boys and 60 girls aged between 3-6 years irrespective of the race and socioeconomic status were randomly selected. The examination was done using pen light and mouth mirror. The occlusal assessment will be done only on children who are healthy and free from extensive caries that would affect the mesiodistal or occluso-gingival dimension of a tooth and, therefore, influence the occlusal characteristics. The primary molar relationship and the canine relationship will be assessed using Foster and Hamilton criteria with the teeth in centric occlusion. Primate space will be measured between primary lateral incisor and canine in the upper and primary canine and deciduous first molar on the lower on both the arches using a digital caliper [0-4 mm]. The obtained data was entered into Microsoft excel and chi-square test will be used for statistical analysis.

Results: The study showed that, on left side, mesial step molar relationship was found in 53.3% boys and 55% girls, whereas on right side, 55% of boys and 51.6% of girls showed mesial step molar relationship. On left side, 77% of boys and 70% of girls showed class I canine relationship. On right side, 73% of boys and 67% of girls showed class I canine relationship. Primate spacings were found in 77% of children in maxilla and 84.7% of mandible.

Conclusion: The in vivo study concluded that, 1. Mesial step molar relationship was the most common Occlusal relationship of primary molars. 2. Class I canine relationship was the most common canine relationship in primary dentition. 3. Maxillary arch showed more percentage of primate spacings than mandibular arch. The early identification of molar and canine relationships and spacing present will help in prediction of future permanent molar relationship and probable future malocclusion.

1. Introduction

As a dentist, it is very important to know the occlusal relationship of primary dentition so that any malocclusion in permanent dentition can be predicted at early stages and corrected accordingly by orthodontic treatments.[1] The ideal occlusion and spacing in primary dentition acts as a mirror for the prevalence of malocclusion in the permanent dentition. The properly placed teeth in dental arch help in maintaining the better health of oral cavity and the supporting structures, but also influence the personality of the children. Malocclusion not only compromises

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maintaining better hygiene and also the health of investing tissue, but can also lead to behavioural and social problems. Malocclusion is a problem affecting a disproportionately large number of Indian children.[2]

The second most common of the dental diseases in children and young adults next to dental caries is malocclusion. It has been reported that the prevalence of malocclusion in India varies from 20 to 43%.[3] The canine relation in the primary dentition is known to influence the canine relation in permanent dentition because it is thought to be a stable relation in the deciduous period.[4] Davies et al,[5] explained that the canine is considered to be cornerstone, which is important for developing occlusion. In permanent dentition, canine helps in lateral excursive movement by guiding the mandible.

The amount of literature available regarding the canine and molar relationships in the primary dentition is limited. Hence, this study was intended to assess primary canine and molar occlusion in children from 3 to 6 years in Davanagere city, Karnataka.

The present in vivo study was carried out, with the following aims and objectives.

1. To assess the terminal molar relations
2. To assess the primary canine relations

2. Methodology

A total of 120 children, comprising of 60 boys and 60 girls aged between 3-6 years irrespective of the race and socioeconomic status were randomly selected from the out-patient clinic of the Department of Pediatric and Preventive Dentistry at College of Dental Sciences, Davangere, Karnataka, India. Ethical clearance to conduct the study was obtained from the Institutional ethical review board.

2.1. Inclusion criteria

1. Children age <6 years
2. Complete set of primary teeth

2.2. Exclusion criteria

1. Eruption of any permanent first molar/ incisor tooth
2. Grossly decayed teeth

2.3. Procedure

The examination was done using pen light and mouth mirror. The occlusal assessment will be done only on children who are healthy and free from extensive caries that would affect the mesiodistal or occluso-gingival dimension of a tooth and, therefore, influence the occlusal characteristics. The primary molar relationship and the canine relationship will be assessed using Foster and Hamilton criteria with the teeth in centric occlusion.

2.4. Primary molar relationship (terminal plane)

The relationship of the maxillary and mandibular second primary molars in the vertical plane.

Flush terminal plane: The distal surfaces of upper and lower primary second molars are in one line with each other when the primary teeth are in occlusion.

Distal step: The distal surface of lower primary second molar is distal to the distal surface of the primary upper second molar in occlusion.

Mesial step: The distal surface of lower primary second molar is mesial to the distal surface of the upper primary second molar in occlusion.

2.5. Primary canine relationship

1. Class I: the cusp tip of the upper primary canine is in the same vertical plane as the distal surface of the lower primary canine.
2. Class II: the cusp tip of the upper primary canine tooth is mesial to the distal surface of the lower primary canine.
3. Class III: the cusp tip of the upper primary canine is distal to the distal surface of the lower primary canine.

2.6. Statistical analysis

The obtained data was entered into Microsoft excel and summary statistics were performed. Results were presented as frequencies and percentages.

3. Results

Table 1 shows the comparison of various primary molar relationships of boys and girls in both left and right sides. On left side, in boys, flush terminal plane was seen in 40%, mesial step in 53.3% and distal step in 67%. Whereas, in girls, flush terminal plane was seen in 35%, mesial step in 55% and distal step in 6.7%. On right side, in boys, flush terminal plane was seen in 38.3%, mesial step in 55% and distal step in 6.7%. Whereas in girls, flush terminal plane was seen in 43.4%, mesial step in 51.6% and distal step was seen in 5%. There were no statistically significant differences between boys and girls in all the types of primary molar relations on both left and right sides.

Table 2 shows the comparison of primary canine relationships between boys and girls. On left side, in boys, class 1 was found in 77%, class 2 was seen in 13%, and class 3 in 10%. Whereas in girls, 70% showed class 1, 17% showed class 2 and 13% showed class 3 canine relationships respectively. On right side, in boys, class 1 was found in 73%, class 2 was seen in 17%, and class 3 in 10%. Whereas in girls, 67% showed class 1, 20% showed class 2 and 13% showed class 3 canine relationships respectively. There were no statistically significant differences between boys and girls in relation to primary canine relationship on both

Table 1: Distribution of occlusion on both right and left sides across gender

Side	Primary molar relationship	Boys n (%)	Girls n (%)	Chi -square test	P value
	Flush Terminal Plane	24 (40%)	21 (35%)		
Left side	Mesial Step	32 (53.3%)	36 (60%)	0.578	0.749
	Distal Step	4 (6.7%)	3 (5%)		
	Flush Terminal Plane	23 (38.3%)	26 (43.4%)		
Right side	Mesial Step	33 (55%)	31 (51.6%)	0.389	0.823
	Distal Step	4 (6.7%)	3 (5%)		

Table 2: Distribution of canine relationship on right and left sides

Side	Primary canine relationship	Boys n (%)	Girls n (%)	Chi-square test	P value
	Class I	46 (77%)	42 (70%)		
Left side	Class II	8 (13%)	10 (17%)	0.689	0.708
	Class III	6 (10%)	8 (13%)		
	Class I	44 (73%)	40 (67%)		
Right side	Class II	10 (17%)	12 (20%)	0.658	0.719
	Class III	6 (10%)	8 (13%)		

left and right sides.

4. Discussion

It is very important to identify discrepancies in primary dentition as they help in determining the future occlusion of permanent teeth and there will be chance to apply early interceptive approach to prevent further damage.[6] In our study, the occlusion in primary dentition were determined by primary molar and canine relationships and primate spacings were recorded.

4.1. Primary molar relationship

The most common occlusal relationships studied were FTP, MS & DS. Farsi et al.[7] conducted a study in Saudi Arabia involving 3-5-year-old children and found that 80% of children had FTP, followed by MS in 11.9% and DS in 8.1%. In another study among children aged between 3-5 years, the corresponding percentages were 75%, 13.9%, 11.1%.[8] In another study by Yilmaz et al,[9] among 205 children of age 3-5-years FTP was presented by 88.29% children, followed by distal step in 7.31% and mesial step in 4.4% children.

The FTP was found to be the most common primary molar relationship and considered ideal for transition to class I in permanent dentition.However, rather than FTP, mesial step was found to be the norm for completed primary dentition. The magnitude of mesial step determines whether it would result in class I or III molar relationship.[10] Similar results were obtained by Jones[10] showed that FTP (76%), followed by mesial step (14%) and then distal step (10%).In a study done by Sriram et al[11] bilateral FTP molar relation in children of Hyderabad (72%) and Chennai (74%).

In the present study, regarding primary molar relationship, it was found that, there were no statistically significant differences between left and right sides and between boys and girls. On left side, in boys, the percentages of FTP, MS & DS were 40%, 53.3% and 6.7% respectively, whereas in girls they were 35%, 60% and 5% respectively. On right side, in boys the corresponding values were 38.3%, 55% and 6.7%. Whereas in girls, they were 43.4%, 51.6% and 5% respectively.

In a study done by Bahadure et al,[4] MS molar relationship showed highest occurrence of 57.3% followed by FTP (31.1%) and DS (11.7%). Bhat et al[12] have found increase in MS prevalence with advancing age. In the present study also, MS was found to be more predominant, followed by FTP and DS. Similar results were found in studies done by Anderson et al[13] involving African American children, Bishara et al[14] on North-west European children and Abu Alhaija and Qudeimat[15] on Jordanian children. The changes in the occlusion can be attributed to a combination of mesial migration of the mandibular arch and mesial shift of the mandible, which is due to the continuation of growth.[16]

Bishara et al[14] found that the distal step relationship in primary dentition almost always developed into Class II molar relation in permanent dentition, and hence early orthodontic intervention should be considered as these cases are not corrected by itself with advancing age. They concluded that, FTP develops into a class I molar relationship in 56% of cases and Class II molar relationship in 44% of cases. Thus, the children with FTP should be under regular observations to start early orthodontic treatment if required. MS in primary relation would result in class I molar relation most frequently, the occurrence of class III molar relationship increases if there is increase in the amount of mesial step and class II molar relation will be seen to a lesser degree. Hegde et al[17] reported that, with increase in age, the children exhibiting distal step molar relationship decreases and there will be increase in MS and this allows early prediction of permanent molar relationship

more accurately. In the present study, the higher prevalence of MS and FTP may be a positive factor that contributes to the developing class I molar relationship in permanent dentition.

4.2. Primary canine relationship

In the present study, the comparison of primary canine relationships between boys and girls. On left side, in boys, class 1 was found in 73%, class 2 was seen in 17%, and class 3 in 10%. Whereas in girls, 67% showed class 1, 20% showed class 2 and 13% showed class 3 canine relationships respectively. There were no statistically significant differences between boys and girls in relation to primary canine relationship on both left and right sides.

In a study by Bahadure et al,[4] class I (47.20%) showed the highest value following class II (42.83%) and class III (9.97%). Another study by Baidas et al[8] found that class I (90%), followed by class II (47.83%) and class III (9.97%). Similarly, in the present study, class I canine relationship was found to be more represented and same was reported by study done by Bhayya DP et al[18] in various ethnic groups.

The percentage of class II canine relationship in the present study is very less when compared with studies done in Iran (49.1%), England (45%) and Denmark (31.6).[19–21] The decreased prevalence of class II canine relationship found in the present study may be explained by the hypothesis put forward by Farsi and Salama that at the age of 5-6 years, the termination of sucking habit may diminish the prevalence of class II canine relationship in at least some cases.[7] Farsi et al[7] and Otuyemi et al[22] found that class I canine relationship was found in 57% children and 74.5% respectively whereas in the present study, it was found to be 77% in boys and 70% in girls. Similar findings were seen in studies done by Bahadure et al,[4] Shah et al[23] and Vegesna M, et al,[24] while contradictory findings were reported in Finnish children where class II canine relationship was found to be more common.[24] In contrast, Kumar et al[25] found that class III canine relationship (61%) was more predominant, followed by class I (27%) and class II (12%).

5. Conclusion

The in vivo study concluded that,

1. Mesial step molar relationship was the most common Occlusal relationship of primary molars.
2. Class I canine relationship was the most common canine relationship in primary dentition.

The early identification of molar and canine relationships will help in prediction of future permanent molar relationship and probable future malocclusion.

6. Source of Funding

None.

7. Conflict of Interest

None.

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