Original Research

The evaluation of occlusal relationship between the primary canines and primary molars in 3 to 5-year-old Iranian children

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Abstract

Aim: As to the assessment of occlusal status pertaining to primary canines and molars, the latter is less within reach as it is difficult to guide jaws towards a centric occlusion while maintaining a vintage point in both direct and indirect observation.

This study was originally intended to assess primary canine occlusion as a practical indicator in the evaluation of primary molar occlusion, which is otherwise less feasible in dental examination. **Method and materials:** A total of 281 healthy children (145 males and 136 females), with complete primary dentition and without erupted permanent teeth and serious caries were examined by a trained student of dentistry. Occlusal patterns of primary second molars were noted as flush terminal plane, distal step and mesial step and for primary canine as class I, class II and class III with regard to Angle's classification. **Results:** Overall, Class II canine occlusion seemed to have coincided with more than half of the flush terminal molar occlusions (62%), whereas class I was largely associated with mesial step molars (61.2%). This was also found to be applied to cases undergoing unilateral assessment. ($p<0.05$). **Conclusion:** In the present study, a significant correlation between the primary canine and molar occlusal patterns ($p<0.05$) was found on both sides.

Importance of study: the evaluation of primary canine occlusion can be used in preschool children as a simple practical method of predicting future discrepancies in the permanent dentition.

Keywords: Primary dentition, occlusion, canine, molar, children, prospective cohort study.

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Introduction

Permanent teeth occlusion is known to depend largely on primary dentition occlusion (1, 2). Thus, any malocclusion in the latter can result in discrepancies in the permanent dentition, which draws in particular attention as well as consideration (3).

The evaluation of the terminal plane in the primary second molars as well as the existence of interdental spaces could be effective factors in the occlusion status of the succeeding permanent dentition (4). In this light, the primary canine and molar occlusal relationships have separately been assessed in various studies. Banker et al. indicated that class I and flush terminal plane have been found to be the most common features in the primary canine and the primary molar occlusal patterns among American-Mexican children.5 In another study carried out in Australia, primary canines were shown to be of lower incidence in class I, compared to primary second molars in a group of 3 to 6 year-old subjects.6

On the other hand, occlusal examination requires experience, skill, and patience, particularly if assessing primary molar regions. As to the assessment of occlusal status pertaining to primary canines and molars, the latter is less within reach as it is difficult to guide jaws towards a centric occlusion while maintaining a vintage point in both direct and indirect observation.

Given the paucity of literature available, this study was originally intended to assess primary canine occlusion as a practical indicator in the evaluation of primary molar occlusion, which is otherwise less feasible in dental examination.

Method and materials

This study was based on simple trunked sampling of 785 preschool cooperative children aged between 3 and 5 years selected randomly from kindergartens across the city of Mashhad. A total of 281 healthy children (145 males and 136 females), with full set of primary dentition and without any erupted permanent teeth, serious caries especially in interproximal surfaces and any particular oral habit were included in our registry. While those with extensive caries, restored teeth and developmental anomalies were excluded. The examination was performed by a trained student of dentistry equipped with mouth mirror as well as a headlamp and an explorer. Tell-Show-Do technique was applied to gain better control over child's behavior in addition to achieving proper centric occlusion.

The primary second molars and canines were evaluated in terms of their occlusal relationships in centric occlusion. The occlusal relationships of primary second molars were noted as flush terminal plane, distal step and Mesial step with regard to the vertical plane passing the distal surface of maxillary and mandibular primary second molars. Likewise, the occlusal relationships of primary canines were classified as class I, class II and class III in view of the vertical plane passing the cusp tip of the maxillary primary canine and the distal surface of the mandibular primary canine.7

To ensure reliability of the dental exam, the examiner was assigned to repeat the process in 10 cases no later than a week, using Cronbach's alpha (7.3) and the results turned out to be within acceptable range.

Finally, the results were analyzed via the Statistical Package for Social Science (SPSS) software version 11.5.The Pearson's Chi-square test was used to compare the frequencies, considering the P-Value < 0.05 as statistically significant difference.

Results

Bilateral dental examination performed on 264 children, with 17 cases subject to unilateral dental examination. A significant difference ($p<0.05$) was noted as class II canine occlusion seemed to have coincided with more than half of the flush terminal molar occlusions, whereas class I was largely associated with mesial step molars. (Table 1). This was also found to be applied to cases undergoing unilateral assessment.

As to the class II canine occlusal pattern, the cusp tip of the upper primary canine was found to be in line with the posterior, middle and anterior one third of the lower canine in 120(87%), 15(10.9%) and 3(2.1%) cases respectively.

It is noteworthy to mention that left and right-sidedness did not alter the frequency of molar occlusal patterns where the results were compatible in more than half of evaluations. [Table 2]

Table 1. Comparison of molar occlusal relationships in different canine occlusal classes among 3-5 years old children

Molar occlusion		Flush terminal	Mesial step	Distal step	Chi^2 P value
Canine Occlusion	Class I	85 (35.1%)	148 (61.2%)	9 (3.7%)	0.007
	Class II	177(62.3%)	34 (12.0%)	73 (25.7%)	0.024
	Class III	9 (47.4%)	10 (52.6%)	0	0.381

Table 2. Comparison of molar occlusal pattern in right and left side among 3-5 year old children

Occlusal pattern		Right side		
		Flush terminal	Mesial step	Distal step
Left side	Flush terminal	91 (69.5%)	30 (32.6%)	12 (29.3%)
	Mesial step	32 (24.4%)	60 (65.2%)	4 (9.8%)
	Distal step	8 (6.1%)	2 (2.2%)	25 (61.0%)
	Chi2 P value	0.001	0.018	0.041

As to our subsidiary findings, age was shown to have affected the incidence of molar occlusion categories. While flush terminal was statistically significant in occurrence among 3 and 4 year-olds (P= 0.011 and P= 0.07 respectively), mesial step was commonly reported in their older counterparts (5-year-old with 43.8%) (P=0.272). In contrast, canine occlusion was not associated with age from a statistical perspective. (p=0.391)

Gender was an independent factor in association with both occlusal statuses.

Limitation of study

Because of the time limit and complexity of the methodology, the skeletal pattern was not considered in this research which might be affected our result. On the other hand, longitudinal studies for recording occlusal relationships of permanent teeth and compare it with primary stage is seemed to be useful.

Discussion

In the present study, we managed to establish a significant correlation between the primary canine and molar occlusal patterns on both sides.

Most of the distal step and flush terminal molar occlusions are accompanied with class II canine occlusion while class I canine occlusion is more common in cases with mesial step molar occlusion. Class III canine occlusion was not observed in distal step molar occlusions. Assessment of 189 children by Anderson revealed that mesial step molar occlusions were associated with higher incidence of class I occlusal pattern (8).

In the present study, there was no significant statistical difference between the primary canine occlusion and age in contrast with the primary molar occlusion and age. These findings confirmed with the studies of Nanda in India9, Yilmaz in Turkey7 and Hedge et al in India10. Kirzioglu et als in 2013 indicated a statistically meaningful difference ($p<0.001$) in flush terminal plane, mesial step and primary canine occlusal relationships with increased age and no statistically significant difference in distal step ($p>0.05$).3.

This study revealed no significant difference between occlusal relationships and the gender of children which was similar to the results of Candido in Brazil11, Yilmaz in Turkey7 and Otuyemi et al.12 studies.

The flush terminal plane was found to be about 50.2%, mesial step 35.9% and distal step 13.9% in this research. Out of 383 participants in Fernandes et als' study, 55.35% had flush terminal plane and 43.34% mesial step molar relationships.13 Most of the children in Girish et als' study showed flush terminal molar relation (65%) as the highest among all molar relation followed by mesial step (31%).14 Likewise, Shinan15, Nanda9, Alexander et als in India16, Farsi and Salama in Saudi Arabia17 found flush terminal plane as the most common occlusal relationship in the primary molar. Unlike these, in the studies carried out by Anderson8, Candido 11and Clinch18, mesial step was found to be the most prevalent pattern. These results may root in racial differences between nations.

In the present study, 49.1% of the children showed class II primary canine occlusion while class I and Class III were found to be 47.7% and 3.2% respectively. These rates are in contrast with the data obtained in studies of Fernandes et al13, Farsi and Salama17, Banker et al.5, Abu Alhaja19 and Hedge et al.10 which introduced class I as the most common canine relationship. A class I relationship of the primary canine occurred in 85% of the Alexander et als' subjects.20 Girish et als14 found that class I canine relation (90%) was significant followed by class II (6%).

With respect to the primary molar relationship, 69.5% of flush terminal planes, with the highest ratio in the comparison, are bilateral and symmetrical while asymmetrical pattern almost halved (34%).Onyeaso et al reported only 9.4% asymmetrical molar relationship (21).

There was no significant difference between the right and left canine occlusion in this study which is similar to Girish et als study.14While, Shinan et als15 showed that a little difference between left and right side (79% in left and 75% in right side for class I canine relationship and 64% in left and 65% in right flush terminal plane of molar occlusions).

Conclusion

We observed a significant relation between the class II canine occlusion and flush terminal molar occlusion whereas class I was largely associated with mesial step molars among three to five-year-old children.

Importance of study

In the light of the above, the evaluation of primary canine occlusion can be used in preschool children as a simple practical method of predicting future discrepancies in the permanent dentition. Despite a meaningful relationship between primary canine and molar occlusion in a group of Iranian children in this study, further research in various communities would provide more epidemiological information in this respect.

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