

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

Rasul Sahebalam^{1,2}, Sara Hajian³, Tayebe Mokarami⁴

¹Oral & Maxillofacial Diseases Research Center, Mashhad University of Medical Sciences, Mashhad, Iran

²Assistant professor of pediatric dentistry, Department of Pediatrics, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

³DDS, PhD candidate, Department of Dental Public Health, Faculty of Dentistry, Shahid Beheshti University of Medical Sciences, Tehran, Iran

⁴DDS, Department of Pediatrics, Faculty of Dentistry, Mashhad University of Medical Sciences, Mashhad, Iran

Received 30 August 2017 and Accepted 24 September 2017

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.

Sahebalam R, Hajian S, Mokarami T. The evaluation of occlusal relationship between the primary canines and primary molars in 3 to 5-year-old Iranian children. *J Dent Mater Tech* 2017; 6(4): 176-180.

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, Candido¹¹ and 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.¹⁴ While, 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.

References

1. Infante PF. An epidemiologic study of deciduous molar relations in preschool children. *J Dent Res* 1975; 54(4):723-7.
2. Foster TD, Grundy MC. Occlusal changes from primary to permanent dentition. *Br Dent Orthod* 1986; 13(4):187-93.
3. Kirzioglu Z, Simsek S, Yilmaz Y. Longitudinal occlusal changes during the primary dentition and during the passage from primary dentition to mixed dentition among a group of Turkish children. *Eur Arch Paed Dent* 2013; 14(2):97-103.
4. Amiri Hoseynzade H. Study of occlusion in 3-5 year-old children in pediatric department in dental faculty of Mashhad. [Doctorate Thesis]. Iran. Dental School of Mashhad University of Medical Science; 1376. (persian)
5. Banker AC, Berlocher CW, Mueller HB. Primary dental arch characteristics of development Mexican-American children. *J Dent Child*, 1984; 51:200-2.
6. Thomas C, Townsend G, Richards L. Occlusal variability in the primary dentition of Australian children. *J Dent Res* 2000; 79:1056. (abstract C-33)
7. Yilmaz Y, Gurbaz T, Simsek S, Dalmis A. Primary canine and molar relationships in centric occlusion in three to six year-old Turkish children: a cross-sectional study. *J Contemp Dent Pract*. 2006; 7(3):59-66.
8. Anderson AA. Occlusal development in children of African American descent. Types of terminal plane relationships in the primary dentition. *Angle Orthod* 2006; 76(1):817-23.
9. Nanda KS, Khan I, Rnald R. Age changes in the occlusal pattern of deciduous dentition. *J Dent Res* 1973; 52(1):221-4.
10. Hegde S, Panwar S, Bolar DR, Sanghavi MB. Characteristics of occlusion in primary dentition of preschool children of Udaipur, India. *Eur J Dent*. 2012 Jan; 6(1):51-5.
11. Candido IRF, de Figueiredo ACP, Cysne SS, Santiago BM, Valenca AMG. Characteristics of primary tooth occlusion in 5-2-year-old children in Joao Pessoa, PB, Brazil. *J Dent Children* 2010; 10(1):215-20.
12. Otuyemi OD, Sote EO, Isiekwe MC, Jones SP. Occlusal relationships and spacing or crowding of teeth in the dentitions of 3-4-year-old Nigerian children. *Int J Paediatr Dent* 1997; 7(3):155-60.
13. Fernandes S, Gordhanbhai Patel D, Ranadheer E, Kalgudi J, Santoki J, Chaudhary S. Occlusal Traits of Primary Dentition among Pre-School Children of Mehsana District, North Gujarat, India. *J Clin Diagn Res*. 2017; 11(1):92-6.
14. Girish R Shavi, Neel V Hiremath, Ravikumar Shukla, Praveen Kumar Bali, Swapnil Kumar Jain, and Sunil Lingaraj Ajagannanavar. Prevalence of Spaced and Non-Spaced Dentition and Occlusal Relationship of Primary Dentition and its Relation to Malocclusion in School Children of Davangere. *J Int Oral Health*. 2015; 7(9): 75-8.
15. Shinan Zhang, Edward Chin Man Lo, and Chun Hung Chu. Occlusal Features and Caries Experience of Hong Kong Chinese Preschool Children: A Cross-Sectional Study. *Int J Environ Res Public Health*. 2017; 14(6): 621.
16. Alexander S, Prabhu NT. Profiles, occlusal plane relationships and spacing of teeth in the dentition of 3-4-year-old children. *J Clin Pediatr Dent* 1998; 22(4):329-34.

17. Farsi MA, Salama FS. Characteristics of primary dentition in group of Saudi children. *Int J Paediatr Dent* 1996; 6(4):253-59.
18. Clinch LM. An analysis of serial models between three and eight year of age. *Transaction of British society for the study of orthodontics* 1951; 7(1):61-72.
19. Abu Alhaija ESJ, Qudeimat MA. Occlusion and tooth/arch dimension in primary dentition of preschool Jordanian children. *Int J Paediatr Dent* 2003; 13(4):230-9.
20. Alexander SA, Askari M, Lewis P. Occlusal Characteristics of the Primary Dentition Revisited. *N Y State Dent J*. 2015; 81(6):34-9.
21. Onyeaso CO, Isiekwe MC. Occlusal changes from primary to mixed dentitions in Nigerian children. *Angle Orthod* 2008; 78(1):64-9.

Corresponding Author:

Sara Hajian

Address: Department of Dental Public Health, Faculty of Dentistry,
Shahid Beheshti University of Medical Sciences, Daneshjoo Blvd, Tehran , Iran

Tel: +9821-22421813

Email:hajiansara@yahoo.com