

Primary Canine and Molar Relationships in Centric Occlusion in Three to Six Year-Old Turkish Children: A Cross-Sectional Study

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Abstract

This cross-sectional study aimed to evaluate the primary canine and the primary molar relationship in 205 (90 girls and 115 boys) three to six year-old Turkish children with the primary dentition in centric occlusion according to gender and age. In terms of the molar relationship, Class I was represented by 88.29% of all children who agreed to participate in the study, followed by Class II (7.31%), and Class III (4.4%). In terms of the canine relationship, Class I was represented by 87.8% of the sample, followed by Class II (7.8%), and Class III (4.4%). A statistically significant difference was found between age and both the canine and molar relationships ($p < 0.005$), and a positive correlation was confirmed among them. However, the difference and correlation between the gender and the canine and molar relationships were not significant.

Keywords: Occlusion, primary dentition, occlusal relationship, flush terminal plane, distal step, mesial step

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Introduction

One of the most frequent problems dentists face is to determine the occlusion in the primary dentition. Research on the occlusion of primary dentition has been carried out among the children of different age groups in various regions of the world and indicates different results among various ethnic groups.

Ferreira et al.¹ stated the prevalent occlusal relationship between primary canine and primary molar among Brazilian children was Class I.¹ In a study done with Australian children in a three to six year-old age group the rate of Class I relationship was found to be lower in the primary canine than in the primary second molar.² In a study carried out among Finnish, Asian-Arab, and African children the sagittal direction relationship of dental arches was determined using the primary second molar as a reference. The results revealed neutral occlusion showed a change from 84% to 97%, distal occlusion from 1% to 13%, and mesial occlusion from 1% to 2%.³



Infante⁴ evaluated the occlusion of primary second molars among five to six year-old children and observed a significant decrease in a Class II relationship with an increase in age. However, he stated the number of people with Class III relationships was so low it would not be worth discussing.⁴ Otuyemi et al.⁵ found 74.5% of three to four year-old children had a Class I primary second molar relationship, 1.9% had a Class II relationship, and 20.9% had a Class III relationship. They also observed 73.3% had a Class I primary canine relationship, 3% had a Class II relationship, and 14.7% had a Class III relationship.

Banker et al.⁶ assessed the relationships between the primary canine and the primary molar in the

primary dentition among American children of Mexican origin and found the primary canine occlusion predominantly in a Class I relationship and there was no Class III relationship. Moreover, they stated primary second molar occlusion ended on the flush terminal plane among most of the children, and the primary molar distal step existed in only a few cases.

In a recent cross-sectional study of the occlusion of Saudi children in three to five year-old age groups, the rate of ending on the flush terminal plane in the primary second molar was the highest, followed by the mesial step relationship, and the lowest relationship being the distal step. In primary canine occlusion, however, while it was found the Class I relationship was the highest, unlike molar occlusion, Class II followed, and the Class III relationship was the lowest.⁷

The purpose of this study was to assess the occlusal relationships between the primary canine and the primary molar in the primary dentition in terms of age and gender in centric occlusion among a group of three to six year-old Turkish children.

Methods and Materials

This cross-sectional research, carried out among three to six year-old children who attend the crèches (daycare centers) of Erzurum province, was used to determine the relationships between the primary molar and the primary canine in the primary dentition in terms of age and gender in centric occlusion. The age of each child was obtained from the school register. A total of 205 (90 females and 115 males) healthy children were included in the research, which coincides with the number of qualified children who attended the crèches registered in Erzurum Social Security Directorate. These crèches are administered by the Social Services Directorate in Turkey.

Three research assistants in the Department of Pedodontics who are continuing their doctoral studies carried out the occlusion examination of children. All three research assistants were educated on the subject of occlusion before the study and they were calibrated. When disagreement occurred during the examinations, a decision by consensus was made. The children

were taken into well-sunlit rooms of the crèches and sat upright on a chair for examination. A pen light, a mouth mirror, and explorer were used during the examination.

Patient Selection

Following were the criteria for the occlusion evaluation of the children:

- Possess a complete primary dentition
- No loss of primary teeth
- Free of extensive caries, which affect the mesio-distal and occluso-gingival dimension of primary teeth
- Free of permanent teeth

Evaluation Criteria

When the primary teeth of the examined children were placed in centric occlusion, both their primary second molar and primary canine teeth were evaluated in terms of their occlusal relationship. The occlusal relationship of primary second molar was noted as follows:



1. **Flush terminal plane:** The distal surfaces of maxillary and mandibular primary second molars lie in the same vertical plane.
2. **Distal step:** The distal surface of the mandibular primary second molar is distal to that of the maxillary primary second molar.
3. **Mesial step:** The distal surface of the mandibular primary second molar is mesial to that of the maxillary primary second molar.

The occlusal relationship of primary canine was noted as follows:



1. **Class I:** The cusp tip of the maxillary primary canine tooth is in the same vertical plane as the distal surface of the mandibular primary canine.
2. **Class II:** The cusp tip of the maxillary primary canine tooth is mesial to the distal surface of the mandibular primary canine.

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

In determining the relationships between primary second molar and primary canine the occurrence of the same occlusion on both sides was used as the evaluation criterion. In the determination of primary second molar relationship, if one side ends with distal or mesial step while the other side ends with flush terminal plane, it was recorded as flush terminal plane. In the determination of canine relationship, if there was a Class II or Class III relationship on one side and a Class I on the other, it was recorded as a Class I relationship. In the determination of the occlusal relationship of both primary second molars and primary canines, the children with mesial step on one side and distal step on the other were left out of assessment.

X² test and correlation analysis were used in the comparison of data obtained from the children who were exposed to further dental examination. In order to determine the differences of occlusal relationship between the age groups the significance test of the difference between the two percentages was used.

Results

Table 1 shows the distribution of children examined in terms of age and gender. Of the 205 children whose occlusal relationship of the primary second molars were observed, 88.29% showed a flush terminal plane, 7.31% a distal step, and 4.4% a mesial step. Table 2 shows the percentages of the occlusal relationship of the primary second molars of each age group.

It was found the most common occlusal relationship for every age group was the ending of primary second molars on the flush terminal plane. It was observed the molar relationship with distal step was 10.7% for three year-olds, 4.8% for four year-olds, 7.3% for five year-olds, and 8.5% for six year-olds. When comparing the groups in pairs, statistically no significant difference was found ($P > 0.05$). The molar relationship with mesial step was not observed in any of the three and four year-old girls and boys. In five to six year-old children this occlusal relationship was found to be 1.8% and 13.6%, respectively, and the difference between their

Table 1. The distribution of the children examined in terms of age and gender.

Age			Total
	Girls	Boys	
3	11	17	28
4	29	34	63
5	24	31	55
6	26	33	59

Table 2. The percentages of the occlusal relationship of primary second molar in terms of age.

Age	Occlusal Relationship		
	Flush Terminal Plane (%)	Distal Step (%)	Mesial Step (%)
3	89.3	10.7	---
4	95.2	4.8	---
5	90.9	7.3	1.8
6	77.9	8.5	13.6

occurrence percentages was determined to be statistically significant ($P < 0.05$). When the ages of all the children were compared with the primary second molar occlusion, the difference was found to be statistically significant ($P < 0.05$) and a positive relationship between them was observed. It was also observed in the same group of children the difference between their gender and primary second molar occlusal relationships was statistically insignificant ($P > 0.05$).

In the present study primary canine relationship was found to be 87.8% in Class I, 7.8% in Class II, and 4.4 % in Class III. Table 3 shows the percentages of primary canine relationships in terms of age in the studied children. The most common primary canine relationship among all age groups was observed to be Class I. Class II primary canine relationship between three to six year-olds showed fluctuations, but these were found to be statistically insignificant

($P > 0.05$). Class III relationship was not observed among three and four year-old age groups. This relationship among five year-old children was 1.8%, whereas it was 13.5% among six year-olds; the difference between these two groups was statistically significant ($P < 0.05$).

As it was between primary molar relationships, the difference between the primary canine relationships due to change in age was found to be statistically significant ($P < 0.005$) and a positive relationship was observed between them. While the difference between the primary canine relationships and gender among four year-old children was found to be statistically significant ($P < 0.05$), it was insignificant among other age groups ($P > 0.05$).

Discussion

In order to foresee the possibility of a malocclusion development in the permanent dentition, one should know the occlusion in the

Table 3. The percentages of the occlusal relationship of primary canine in terms of age.

Age	Occlusal Relationship		
	Class I (%)	Class II (%)	Class III (%)
3	89.3	10.7	---
4	95.2	4.8	---
5	90.9	7.3	1.8
6	76.3	10.2	13.5

primary dentition. Various epidemiological data have been reported about the occlusion properties of primary dentition among pre-school children of some ethnic groups.^{1,4,5,7,8,9} However, there has been no epidemiological study on Turkish children of the same age group.

In the present study primary second molar occlusal relationship was observed to be on the flush terminal plane among 88.29% of the examined children. This rate is in accordance with the data obtained in other communities though it is slightly higher than them. Gençay et al's data was on the contrary, in research carried out among 40 Turkish three to four year-olds, they found the rate of the flush terminal plane of primary second molars as 30%.⁸

In this study the distal step was found to be about 7.31% in all ages and no significant statistical difference between the ages in terms of distal step frequency was observed ($P>0.05$). There was no mesial step in the three and four year-old groups, whereas in the five and six year-old groups this relationship indicated a statistically significant increase ($P<0.05$). Similarly, Infante, in his research carried out by grouping the ages of the children, reported there was no mesial step among two to three year-old children, and this relationship in four to five year-old groups was only 1.7%. He did not mention, however, from which group, i.e., the four to five year-old group, this mesial step resulted.⁴ Nanda⁹, in his research, also did not observe any difference in Class II molar relationship frequency with the change in age although he noted a significant difference in Class III molar difference frequency.⁹ Unlike these, some researchers found the distal step frequency was lower than the mesial step

frequency.^{1,5,7,8} The reason for the increase in the mesial step frequency may be the growth of the mandible in an anterior direction.

Bishara et al.¹⁰ evaluated the changes that occur during the passage from primary second molar relationship to permanent first molar relationship. They stated in the cases showing flush terminal planes in the primary dentition, 56% Class I and 44% Class II relationships developed in the permanent dentition. Since a flush terminal plane in the primary dentition may cause unwanted molar relationships in the permanent dentition, they advised these cases should be observed in order to engage them in early orthodontic treatment, if necessary. They observed when distal step existed in the primary dentition, a Class II molar relationship occurred in the permanent dentition; therefore, the treatment should be started at an early stage because self-treatment would not be possible. They noted when mesial step existed in primary dentition, the occurrence of a Class I relationship would be more and Class II relationship would be less frequent in the permanent dentition. Moreover, they stated the occurrence of Class III molar relationship in the permanent dentition would be the result of the magnitude of the mesial step.¹⁰

In the light of these data Ngan and Fields reported the desired molar relationship should be in the form of either flush terminal plane or mesial step in the primary dentition. This study, though it is a cross-sectional one, indicated the highest rates of flush terminal plane and a significant increase in a mesial step in five and six year-old children.¹¹

In this study the most common occlusal relationship in primary canine was found to be Class I with the rate of 87.8% in all age groups.

The Class II relationship followed with a 7.8% frequency rate and no statistically significant difference was detected with an increase in age ($P>0.05$). The three and four year-old groups demonstrated no Class III primary canine relationship, whereas in five and six year-old children a significant increase in this relationship with an increase in age was observed ($P<0.05$). A review of other research shows the most common form of the primary canine relationship is Class I in various ethnic groups.^{1,2,5,6,7,8} Although the results of this present study about the frequency of Class II and Class III primary canine relationships are consistent with the results reported by Banker et al.⁶, they conflict with the results of some other researchers.^{5,7}

The differences in the results of both primary canine and primary second molar relationships spring from the methods used in the research and the number of the samples. In this study, in order to create a stable centric occlusion, the children were examined in a seated position and a pen-light, mouth mirror, and explorer were used for evaluation.

In most research done on this subject the gender and occlusion relationships were not compared.



Otuyemi et al.⁵ compared the gender of children and occlusal relationship and found no statistical difference between them. In this study similar results were obtained among all age groups for primary second molar relationships and except for the four year-old group, primary canine relationship⁵

Conclusion

The results obtained in this study indicate it is necessary for parents to take their pre-school children to a dentist for the growth of an ideal occlusion in the permanent dentition. Moreover, they also indicate the importance of new research on the pre-school Turkish children living in various parts of Turkey, which would provide more epidemiological data.

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