

ORIGINAL RESEARCH ARTICLE

OCCLUSAL CHARACTERISTICS INCLUDING SPACING AMONG PRESCHOOL CHILDREN: A CROSS-SECTIONAL STUDY

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ABSTRACT

Background: Understanding the association between morphological aspects in the primary dentition and its transition to the permanent dentition provides the possibility of predicting the final permanent occlusion. Study on the occlusal characteristics in deciduous dentition in Nepalese population is limited. This study was aimed to assess the occlusal characteristics and spacing in primary dentition in preschool children.

Methods: The cross-sectional study was conducted among 432 preschool children around Kathmandu valley after getting permission from Institutional Review Committee of Kathmandu Medical College and Teaching Hospital. Each child fulfilling the inclusion criteria was enrolled on the study only after their assent and their parent's consent. The primary molar relation, canine relation, overjet, overbite was assessed using Foster and Hamilton criteria with the teeth in centric occlusion. Primate and physiological spaces were assessed. Data was collected and analysis was done in SPSS version 16.

Results: Among the participants, (51.9%) were male and (48.1%) female. Primate spaces was seen to be absent on 157 (36.3%) children. Physiological space was seen among 190 (44%) children. Flush terminal plane molar relationship was more prevalent among 294 (68%) children. Class I canine relationship was found in 257 (59.5%) children. Ideal overjet was seen in 333 (77.1%) children and ideal overbite was seen among 337 (78%) children.

Conclusions: Favorable characteristics traits were seen in the studied population yet longitudinal studies are recommended to predict the possible outcome in permanent dentition.

INTRODUCTION

Development of occlusion is a genetically and environmentally conditioned process, which shows a great deal of individual variations. The initiation of primary teeth occurs during first six weeks of intrauterine life and the first primary tooth erupts at the age of six months. The individual variations apart, it takes around 2.5 -3.5 years for all the primary teeth to establish their occlusion.¹ Features of deciduous dentition period are spacing, terminal plane relation of the deciduous molars, deep bite, wide U shaped dental arches, flat curve of Spee, shallow cuspal interdigitation and more vertically placed incisors.² Many of the observational studies relating to the spacing and occlusion of the primary dentition have confirmed that the occlusal characteristics vary among populations and ethnic groups. Understanding the association between morphological aspects in the primary dentition and its transition to the permanent dentition provides the possibility of predicting the final permanent occlusion. The anteroposterior relation of maxillary and mandibular permanent molars is an important criterion for recognition of malocclusions which determines the necessity of interceptive orthodontics.³ Study on the occlusal characteristics in deciduous dentition in Nepalese population is limited. Proper prediction of the occlusion plays a pivotal

role in helping pediatric dentist to establish an acceptable esthetics and functional occlusion in future. So, this study was formatted to document the occlusal characteristics including spacing among preschool children in Kathmandu valley.

METHODS

A cross-sectional study was conducted among 432 preschool children around Kathmandu valley after getting permission from Institutional Review Committee of the Kathmandu Medical College and Teaching Hospital. The sample was selected by two stage cluster sampling. The Sample size was calculated as: $n = 4Pq / I^2 = 4 \times 80.3 \times 19.7 / (5/100 \times 80.3)^2 = 432$ adding 10% non-response.

The children from whom assent has been taken and whose parents have given written consent for examination, having complete set of deciduous dentition without partially/completely erupted permanent teeth were included in the study. Those children with extensive caries affecting the mesiodistal and occluso-gingival dimension of teeth, infraocclusion and developmental anomalies were excluded from the study. The primary molar relation was categorized as

given by Baume² while the canine relation, overjet, overbite was assessed using Foster and Hamilton criteria⁴ with the teeth in centric occlusion. Spacing conditions was registered between all the teeth in mandible and maxilla and graded according to Kisling and Krebs criteria.⁵ Data was collected and statistical analysis was done in SPSS version 16 using descriptive statistics where frequency and mean were calculated.

RESULTS

Among the 432 participants, 224 were males and 208 females. Mean age of the participants was 4 years (\pm 1.22 SD). Spacing was seen to be present in 286 (66.2%) children (Table 1).

Table 1: Spacing in deciduous dentition

Spacing	Frequency (%)
Present	286 (66.2)
Absent	146 (33.8)
Total	432(100)

The primate spaces were seen to be present in both maxilla and mandible among 152 (35.2%) children while 11(2.5%) children had in mandible only. It was found to be absent in 157 (36.3%) children (Table 2).

Table 2: Primate Spaces in deciduous dentition

Primate Spaces	Frequency (%)
Maxilla	112 (26.0)
Mandible	11(2.5)
Both maxilla and mandible	152 (35.2)
Absent	157 (36.3)
Total	432(100)

Physiological space was seen among only 190 (44%) children. As per the Kisling and Krebs criteria, overlapping of teeth was seen in 45 (10.4%) children, space more than or equal to 2mm was seen only in 74 (17.1%) children and 193 (44.7%) children had their teeth in contact with each other (Table 3).

Table 3: Distribution of physiological spaces

Physiological space	Frequency (%)
Overlapping of teeth	45(10.4)
Contact	193(44.7)
Nocontact	120(27.8)
Space more than or equal to 2mm	74(17.1)
Total	432(100)

Flush terminal plane molar relationship was found to be more prevalent among 294 (68%) children while distal step relation was the least common seen in 66(15.3%) children (Table 4).

Table 4: Molar relationship in deciduous dentition

Molar relationship	Frequency (%)
Flush terminal	294 (68)
Distal step	66 (15.3)
Mesial step	72 (16.7)
Total	432 (100)

Primary class I canine relationship was found in 257(59.5%) children while the least common was the class III canine relationship among 66 (19%) children (Table 5).

Table 5: Primary Canine relationship in deciduous dentition

Canine relationship	Frequency (%)
Class I	257 (59.5)
Class II	93 (21.5)
Class III	82 (19)
Total	432(100)

Ideal overjet was seen in 333 (77%) children, increased overjet was found among 75(17.4%) children while 24 (5.6 %) had reverse overjet (Table 6).

Table 6: Overjet in deciduous dentition

Overjet	Frequency (%)
Ideal	333(77)
Increased	75(17.4)
Reversed	24(5.6)
Total	432(100)

Ideal overbite was seen among 337(78%) children, while 59 (13.7%) children had increased overbite. Only 32 (7.4%) children had reduced overbite and four of them (0.9%) had open bite (Table 7).

Table 7: Overbite in deciduous dentition

Overbite	Frequency (%)
Ideal	337(78)
Increased	59(13.7)
Open bite	4(0.9)
Reduced	32(7.4)
Total	432(100)

DISCUSSION

Managing the developing dentition and occlusion is a great challenge for every clinician. The deciduous dentition with its ideal characteristic features provides the basis for development

of a permanent dentition which is stable, functional, esthetically acceptable and has normal subsequent development.

Spacing seen mesial to maxillary canines and distal to the mandibular canines are known as primate spaces. These spaces help in the placement of canine cusps of the opposing arch.

In this study we found presence of primate spaces in maxilla only among 112 (26%) participants while 11(2.5%) had in mandible in contrast to findings by Shah et al⁶ which showed 61.6% in maxilla and 29.6% in **mandible**. In our study, it was seen that 152 (35.2%) children had primate spaces in both maxilla and mandible which is lower than as seen in studies done by Baume⁷ where it was present on 67% of the studied population, by Kaufman and Koyoumdjisky⁸ where 86.5% of preschool children had primate spaces.

The secondary or developmental spaces found commonly between the incisors are termed physiological spaces.⁷ In our study, physiological space was found to be present in 44% of the children which was less as compared to findings seen by Khan et al⁹ where 69.5% had physiologic spaces. The absence of physiological spaces among more than half of our studied subjects might indicate disproportion between the jaw and tooth size in permanent dentition.

Both the canine and molar relationships are taken into consideration to make a reliable prediction of the intermaxillary relationship in the permanent dentition. As flush terminal was the most common molar relation we assume that most of the children would have a favorable permanent molar relationship.

In this study, flush terminal plane molar relationship was found to be more prevalent among 294 (68 %) children while the least common was distal step relation which was seen in 66 (15.3%) children. This findings had similar results as studies done by Baume⁷ who found out 76% of flush terminal relationship, 14% mesial step and only 10% distal step. In addition, Otoyemi et al¹⁰ also reported majority of Nigerian children with flush terminal relationship (74.5%). In contrast to studies done in same population by Shah et al⁶ where mesial step molar relationship was seen in more than half of the studied population. Baral et al¹¹ also found mesial step molar relationship to be common in his studied population in Kaski district of Nepal. A study done in Indian population by Bahadure et al¹² showed 57.3% of children with mesial step followed by flush terminal molar

relationship in contrast to this study.

This study showed Class I canine relationship to be the most common in more than half of the children while the least common was the class III canine relationship among 19% children. Similar findings was seen in studies conducted by Bahadure et al¹², Shah et al⁶ and Vegesna et al³ while contradictory findings were reported in Finnish children where class II canine relationship was found to be more common.¹³

In this study majority 77% of the children had ideal overjet, increased overjet was found among 17.4% while 5.6 % had reverse overjet which were in agreement to studies done by Oteyumi et al¹⁰, Shah et al⁶.

As seen in the study, Ideal overbite was seen among majority (78%) of the children, various studies showed similar findings.^{3,6} Only four (0.9%) children in the study had anterior openbite as reported in other study done in Tanzanian and Finnish children (8%).¹⁴

The study has few limitations as data could have included specific sides, and in detail findings as per arch wise, gender wise for spacing.

CONCLUSION

Flush terminal molar relation, class I canine relation, ideal overjet and overbite were most common in our study population. Primate and physiological spaces were seen in less than half of the studied population. Understanding the association between morphological aspects in primary dentition and its transition to the permanent dentition provides the possibility of predicting the final permanent occlusion and longitudinal studies in future would prove to be a milestone in determining that in Nepalese population.

CONFLICT OF INTEREST

None

FINANCIAL DISCLOSURE

None

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