Characteristics of occlusion in deciduous dentition of Bamar preschool children in Mandalay Region

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Abstract

In the characteristics of occlusion, primary dentition laid the foundation for proper eruption and alignment of the succeeding permanent dentition. The prevalence of occlusal traits varies among different ethnic group. To determine the characteristics of occlusion in deciduous dentition of Bamar preschool children, intraoral examination was performed in 323 Bamar preschool children (3 to 5 years old) in Mandalay Region. Frequency distribution of physiologic spaces, anthropoid spaces, primary canine relationship and terminal molar relationship were observed and analyzed by using SPSS software (version 22). This study was cross sectional analytical study and it was found that physiologic spaces were more common in upper arch (56.7%) than in lower arch (34.4%). Anthropoid spaces were more common in upper arch (75.5%) than in lower arch (27.9%). Mesial step molar relationship was most common (71.8%) followed by flush terminal molar relationship (24.8%) and distal molar relationship (3.4%).Significant association was found between type of spacing and terminal molar relationship.

Key Word : Physiologic spaces, Anthropoid spaces and Terminal Molar Relationship

Introduction

Childhood is the mirror that reflects the propensity of adulthood. An ideal primary dentition likewise is an indicator of potentially perfect permanent dentition. [1] Characteristic occlusal features of primary dentition consist of mesial step, distal step, flush terminal relationship, physiologic spaces and primate spaces.[2] The occlusal traits in the primary dentition vary among different populations and ethnic groups.[3] The relation between the distal surface of the maxillary and mandibular second primary molars is, therefore, one of the most important factors that influences the future occlusion of the permanent dentition. The terminal plane relationship is used to forecast the future interocclusal relation of the erupting first permanent molars.[4] Spacing often presents between all primary anterior teeth, the most marked spaces present being mesial to canines in the maxilla and distal to canines in the mandible. These are termed primate or anthropoid space. [5] Another form of space in the primary dentition is the

secondary developmental spaces, which are usually found between the incisors. Such dental spaces are termed "physiological spaces". These spaces are significant later for the alignment of erupting permanent teeth and establishment of occlusion. Understanding the characteristic features of primary dentition as well as the changes that take place in the transitional stage from primary to permanent dentition for a particular population is essential for dentists involve in planning early preventive and interceptive orthodontic treatment.[6] The recognition of normal occlusion patterns in primary dentition as well as the identification of morphologic changes during permanent teeth eruption is essential for treatment planning in pediatric dentistry. [7] The purpose of this study, therefore, is to assess the occlusal traits of primary dentition in 3-5-year-olds of Bamar preschool children in Mandalay region.

Material and Method

This study was a cross-sectional, analytical study from September 2016 to September 2017. According to selection criteria, (3 - 5) years old 323 Bamar spreschool children in Mandalay Region were selected after explaining the procedure and taking informed consent form. Name, age, gender, ethnicity of the selected subjects and name and ethnicity of the parents and grandparents were recorded in proforma.

Inclusion Criteria

(i) Healthy pre-school children, aged between 3-5 years

(ii) Both genders

(iii) Pre-schoolchildren whose paternal and maternal grandparents(up to 3rd generation) must be the Bamar race.

(iv) Children with a complete set of primary dentition

(v) Without premature loss of primary teeth

(vi) Children with no erupted permanent teeth.

(vii) Children with teeth free from caries

(viii) Children with no cleft lip and cleft palate

Exclusion criteria

(i) Children with any congenital disease.

(ii) Children with un-cooperative behavior

The procedure of the study will be explained to the child and parents and agreement and consent were taken.After getting agreement, personal data (name, age, sex, date of birth, ethnicity of child and NRC number and ethnicity of parents were interviewed and filled in proforma. The ethnicity of the parents was confirmed from their NRC card. After interviewing, intraoral examination was done by using mouth mirror and tweezers under natural light or torch light. The data was recorded in proforma.

Working definitions

(1) Spaced type – Overall spacing in upper or lower arch: presence of space between two adjacent teeth that means lack of contact between two adjacent teeth. [8]

(2) Closed type – absence of space between two adjacent teeth that means contact between two adjacent teeth. [8]

(3) Anthropoid space is a primate space which was observed as any space regardless of size, mesial to the deciduous cuspid in the maxilla or distal to the deciduous cuspid in the mandible. [9]

(4) Terminal plane relationship of the second primary molars:

- Flush terminal: The distal surfaces of the upper and lower second primary molars in the same vertical plane in centric occlusion.
- Distal step: The distal surfaces of the lower primary second molar in posterior relationship to the distal surface of the upper second molars in centric occlusion.
- Mesial step: The distal surfaces of the lower primary second molar in anterior relationship to the distal surface of the upper second molars in centric occlusion. [10]

Collected data were entered into Statistical Package for Social Sciences (SPSS) (version 22). Descriptive statistics for prevalence percentage will be calculated. Chi square test were applied to test the association of occlusal traits. Statistical significance will be considered at $p<0.05$.

Figure 1. Closed type upper anterior teeth

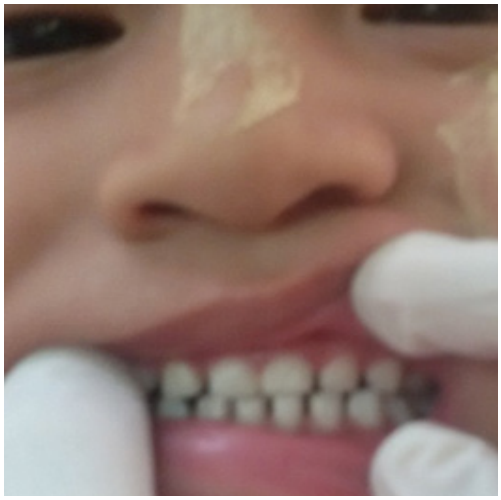

Figure 2. Spaced type upper and lower anterior teeth

Figure 3.Upper anthropoid spaces

Figure 4. Mesial step molar relationship

Result

Table1. Frequency distribution of types of spacing in the upper and lower arches of deciduous dentition of Bamar preschool children

Sex	Upper				P value	Lower				P value
	Spaced		Closed			Spaced		Closed		
	n	%	n	%		n	%	n	%	
Male	97	58.8	68	41.2	0.430	51	30.9	114	69.1	0.181
Female	86	54.4	72	45.6		60	38.0	98	62.0	
Total	183	56.7	140	43.3		111	34.4	212	65.6	

$p < 0.05$ (significant)

Table 1 shows the frequency distribution of types of spacing in the upper and lower arches of deciduous dentition of Bamar preschool children in total sample with their sex differences. There was no statistically significant difference in frequency distribution of types of spacing in the upper and lower arches of deciduous dentition between sexes.

Table2. Frequency distribution of anthropoid space in the upper and lower arches of deciduous dentition of Bamar preschool children

Sex	Upper				P value	Lower				P value
	Anthropoid space		No anthropoid space			Anthropoid space		No anthropoid space		
	n	%	n	%		n	%	n	%	
Male	128	77.6	37	22.4	0.385	54	32.7	111	67.3	0.046*
Female	116	73.4	42	26.6		36	22.8	122	77.2	
Total	244	75.5	79	24.5		90	27.9	233	72.1	

* $p < 0.05$ (significant)

Table 2 represents the Frequency distribution of anthropoid space in the upper and lower arches of deciduous dentition of Bamar pre-school children. Anthropoid space was observed in 77.6% of male and 73.4% of female in upper arch. In upper arch, there was no significant difference in frequency distribution of anthropoid space between sexes. In lower arch, there was significant difference in frequency distribution of anthropoid space between sexes.

Table 3. Frequency distribution of degree of overbite of deciduous dentition of Bamar preschool children

Sex	Degree of overbite												P value
	Normal		Increased		Edge to Edge		Anterior open bite		Anterior cross bite		Posterior cross bite		
	n	%	n	%	n	%	n	%	n	%	n	%	
Male	137	83.0	17	10.3	7	4.2	0	0	2	1.2	2	1.2	0.720
Female	129	81.6	19	12.0	5	3.2	2	1.3	1	0.6	2	1.3	
Total	266	82.4	36	11.1	12	3.7	2	0.6	3	0.9	4	1.2	

$p < 0.05$ (significant)

Table 3 represents the frequency distribution of degree of overbite of deciduous dentition of Bamar preschool children. No significant difference was found in frequency distribution of degree of overbite between sexes.

Table 4. Frequency distribution of degree of overjet of deciduous dentition of Bamar pre-school children

Sex	Degree of Overjet						P value
	0 – 2 mm		2 – 4 mm		>4 mm		
	n	%	n	%	n	%	
Male	158	95.8	7	4.2	0	0	0.934
Female	151	95.6	7	4.4	0	0	
Total	309	95.7	14	4.3	0	0	

$p < 0.05$ (significant)

Table 4 represents the frequency distribution of degree of overjet of deciduous dentition of Bamar pre-school children. Significant difference was not found in frequency distribution of degree of overjet between sexes.

Table 5. Frequenc y distribution of primary canine relationship of deciduous dentition of Bamar pre-school children

Sex	Primary canine relationship												P value
	Class I				Class II				Class III				
	Right		Left		Right		Left		Right		Left		
	n	%	n	%	n	%	n	%	n	%	n	%	
Male	35	21.2	35	21.2	8	4.8	8	4.8	122	73.93	122	73.93	0.349
Female	40	25.3	40	25.3	12	7.59	12	7.59	106	67.08	106	67.08	
Total	75	23.2	75	23.2	20	6.2	20	6.2	228	70.6	228	70.6	

p < 0.05 (significant)

Table 5 represents the frequency distribution of primary canine relationship of deciduous dentition of Bamar pre-school children. There was no significant difference in frequency distribution of primary canine relationship between sexes.

Table 6. Frequency distribution of terminal molar relationship of deciduous dentition of amar pre-school children

Sex	Terminal molar relationship												P value
	Flush terminal plane				Mesial step				Distal step				
	Right		Left		Right		Left		Right		Left		
	n	%	n	%	n	%	n	%	n	%	n	%	
Male	41	24.8	41	24.8	119	72.1	119	72.1	5	3.0	5	3.0	0.930
Female	39	24.7	39	24.7	113	71.5	113	71.5	6	3.8	6	3.8	
Total	80	24.8	80	24.8	232	71.8	232	71.8	11	3.4	11	3.4	

< 0.05 (significant)

Table 6 represents the frequency distribution of terminal molar relationship of deciduous dentition of Bamar pre-school children. There was no significant difference in frequency distribution of terminal molar relationship between sexes.

Table 7. Association between frequency of types of spacing and terminal molar relationship

Type of spacing		Terminal molar relationship						Total	P value
		Flush terminal plane		Mesial step		Distal step			
		n	%	n	%	n	%		
Upper	Spaced	42	23.0	140	76.5	1	0.5	183	0.003*
	Closed	38	27.1	92	65.7	10	7.1	140	
Lower	Spaced	21	18.9	85	76.6	5	4.5	111	0.177
	Closed	59	27.8	147	69.3	6	2.8	212	

* p < 0.05 (significant)

Table 7 shows the association between frequency of type of spacing and terminal molar relationship. In children with spaced type dentition, 23% had flush terminal plane molar relationship, 76.5% had mesial step molar relationship and 0.5% had distal step molar relationship in upper jaw and then 18.9% had flush terminal plane molar relationship, 76.6% had mesial step molar relationship and 4.5% had distal step molar relationship in lower jaw.In children with closed type dentition, 27.1% had flush terminal plane molar relationship, 65.7% had mesial step molar relationship and 7.1% had distal step molar relationship in upper jaw and then 27.8% had flush terminal plane molar

relationship, 69.3% had mesial step molar relationship and 2.8% had distal step molar relationship in lower jaw. There was significant association between frequency of types of spacing and terminal molar relationship in upper arch but not significant in lower arch.

Discussion

Table 8. Comparison of frequency distribution of types of Spacing between other studies and present study

Studies	Physiologic spaces		Anthropoid Spaces	
	Maxillary	Mandibular	Maxillary	Mandibular
Otuyemi et al. (1997)	37.7%	44.0%	8.4%	12.8%
Nagham Al-Sahaf (2005)	21.5%	24.5%	55.5%	36%
Hegde et al. (2012)	49%	50%	56.5%	38%
Bahadure et al. (2012)	49.4%	46.8%	64.7%	50.7%
Bayya et al. (2012)	35.4%	25.7%	47.6%	4.6%
Lochib et al. (2014)	50.9%	46.7%	61.7%	27.9%
Sun et al. (2017)	85.0%	72.1%	83.7%	61.2%
Present Study	56.7%	34.4%	75.5%	27.9%

In Bamar preschool children, physiologic spaces were more common in maxilla (56.7%) than in mandible (34.4%) which was consistent with that of Indian children [11][12][13] and Taiwan children. However, in Indian children of other study [14], Nigerian children [15] and Iraq children [16], physiologic spaces were more common in mandible than in maxilla.

In Bamar preschool children, anthropoid spaces were more common in maxilla (75.5%) than in mandible (27.9%).This finding was consistent with that of Indian children, Iraq and Taiwan children. However, Nigerian children, anthropoid spaces were more common in mandible than in maxilla.

Table 9. Comparison of frequency distribution of overjet and overbite between other studies and present study

	Overjet			Overbite					
	0-2 mm	2-4 mm	>4 mm	Normal 1	Increased	Edge to edge	Anterior open bite	Anterior cross bite	Posterior cross bite
Laila Baidus (2010)	52.3%	30.3%	15.8%	57%	28.2%	7.1%	7.1%	-	8.7%
Bhat et al. (2012)	77.1%	8.7%	0.1%	67.2%	31.7%	0.9%	0.2%	0.7%	1.5%
Bayya.et al. (2012)	82.7%	14.3%	3.0%						
Yadav.et al. (2014)	92.4%	6.4%	1.2%						
Present Study	95.7%	4.3%	0%	82.4%	11.1%	3.7%	0.6%	0.9%	1.2%

In Bamar preschool children, normal overbite was most common (82.4%) and anterior open bite was least common (0.6%). This was consistent with India children [17] and Saudi Arabia children [18]. [19]Higher prevalence of ideal (normal) overjet and overbite observed in Bamar preschool children, it may be conductive to achieve ideal anterior relation in permanent dentition.

Table 10. Comparison of frequency distribution of primary canine relationship between other studies and present study

Studies	Primary Canine Relationship		
	Class I	Class II	Class III
Otuyemi et al. (1997)	73.3%	3.0%	14.7%
Laila Baidus (2010)	90.1%	2.5%	7.4%
Bhaya et al. (2012)	84%	14%	0.3%
Hegde et al. (2012)	80%	20%	0%
Bahadure et al. (2012)	47.20%	42.83%	9.97%
Sham S Bhat et al. (2012)	89%	57%	4%
ImanBugaighis (2013)	69.6%	22.4%	4.4%
Yadav et al. (2014)	67.2%	31.6%	1.2%
Madhuri Vegesna et al. (2014)	81.3%	5.9%	5.8%
Present Study	23.2%	6.2%	70.6%

In Bamar preschool children, class III canine relationship was most common (70.6%). Class I canine relationship was second most common (23.2%) and class II was least common (6.2%). However, in Indian children , Nigerian children , Libya children and Saudi Arabia children , class I canine relationship was most common and followed by class II and then class III.

Table 11. Comparison of frequency distribution of terminal molar relationship between different studies and present study

Studies	Terminal molar Relationship		
	Mesial step	Distal step	Flush terminal plane
O.D.Otuyemi.et al.,(1997)	20.9%	1.9%	74.5%
Laila Baidus (2010)	13.9%	11.1%	75%
Deepak P Bhaya.et al., (2012)	36.9%	8.4%	52.5%
Sapna Hedge.et., (2012)	50%	1%	49%
Rakesh N.Bahadure.et al., (2012)	57.3%	31.1%	11.7%
Sham S Bhat. et al.,(2012)	29.7%	2.2%	68.1%
Nisha Rani Yadav.et al., (2014)	25.2%	12.4%	62.4%
Semma Lochib.et al., (2014)	12.8%	2.4%	65.1%
Madhuri Vegesna.et al.,(2014)	3.6%	10.7%	80.3%
Prakash Baral,et al.,(2014)	40.3%	8.5%	33.5%
Present Study	71.8%	3.4%	24.8%

In Bamar preschool children, mesial step was most common (71.8%). Flush terminal plane was second most common (24.8%) and distal step was least common (3.4%). This was consistent with Indian children [14] and Nepal children [17]. However, in Indian children [11][18][19] [20][21],Nigerian children [22] and Sadi Arabia children [23] , flush terminal plane was most common

Association between frequency of type of spacing and terminal molar relationship

There was significant association between frequency of type of spacing and terminal molar relation in upper arch. In upper arch, mesial step and flush terminal plane molar relation was more common in spaced dentition than in closed dentition. In lower arch, mesial step and flush terminal plane molar relation was more common in closed dentition than in spaced dentition. In upper and lower arch, distal step molar relation was more common in closed dentition than spaced dentition

Conclusion

Occlusal characteristics of primary dentition such as physiologic spaces, primate spaces, terminal molar relationship were important not only for permanent dentition but also for treatment planning in pediatric dentistry and interceptive orthodontics. This study gave occlusal characteristics of Bamar preschool children and association between these features. The present study found that

1. Physiologic spaces were found in most of Bamar preschool children and these spaces were more common in maxilla than mandible.
2. Primate spaces were more common in maxilla than mandible.
3. Most of Bamar preschool children had normal overjet and overbite.
4. Class III canine relationship was most common and followed by class I canine relationship and class II canine relationship.
5. Bamar preschool children mostly had mesial step molar relation followed by flush terminal molar relationship and distal step molar relationship.
6. There was significant association between type of spacing and terminal molar relations.

References

1. Wright, G. Z. and Kennedy, D. B. (1978). Space control in the primary and mixed dentitions. Dental Clinics of North America, 22(4), pp.579–601.
2. Bahadure, R.N., Thosar, N. and Gaikwad, R. (2012). Occlusal traits of deciduous dentition of preschool children of Indian children. Contemporary Clinical Dentistry, 3, pp.443-7.
3. Lauc, T. (2003). Orofacial analysis on the Adriatic islands: an epidemiologic study of malocclusion on Hvar island. Eur J Orthod, 25, pp.273-8.
4. Sriram, C.H., Priya, V.K., Sivakumar, N., Maheshwar, Reddy K.R., Babu, P.J. and Reddy, P. (2012). Occlusion of primary dentition in preschool children of Chennai and Hyderabad: a comparative study. Contemp Clin Dent, 3, pp.31-7.
5. Sampson, W.J. and Richards. (1985). Prediction of mandibular incisor and canine crowding changes in mixed dentition. Am J Orthod, 2, pp.47-63.
6. Alexander, S., Prabhu, N.T. (1998). Profiles, occlusal plane relationships and spacing of teeth in the dentitions of 3 to 4 year old children. J Clin Pediatr Dent, 22(4), pp.329-34.
7. Bishara, S.E., Hoppens, B.J., Jakobsen, J.R. and Kohout, F.J. (1988). Changes in the molar relationship between the deciduous and permanent dentitions: a longitudinal study. Am J Orthod Dentofacial Orthop, 93(1), pp.19-28.

8. Kisling, E. and Krebs, G. (1976). Patterns of occlusion in 3-year-old Danish children. Community Dentistry and Oral Epidemiology, 4, pp.152-159.

9. Boyko, D.J. (1968). The incidence of primate space in fifty 3-years old children of Burlington study. Am J Orthod, 54, pp.462-5.

10. Farsi, M.A. and Salama, F.S. (1996). Characteristics of primary dentition in group of Saudi children. Int J Paediatr Dent, 6, pp.253-259.

11. Bahadure, R.N., Thosar, N. and Gaikwad, R. (2012). Occlusal traits of deciduous dentition of preschool children of Indian children. Contemporary Clinical Dentistry, 3, pp.443-7.

12. Lochib, S., Indushekar, K.R., Saraf, BG., Sheoran, N. and Sardana, D. (2015). Occlusal characteristics and prevalence of associated dental anomalies in the primary dentition. Journal of Epidemiology and Global Health, 5, pp.151– 157.

13. Bhayya, D.P., Shyagali, T.R., Dixit, U.B. and Shivaprakash. (2012). Study of occlusal characteristics of primary dentition and the prevalence of maloclusion in 4 to 6 years old children in India. Dental Research Journal, 9, pp.619-23.

14. Hegde, S., Panwar, S., Bolar, D.R. and Sanghavi, M.B. (2012). Characteristics of occlusion in primary dentition of preschool children of Udaipur, India. Eur J Dent , 6, pp.51-55.

15. Otuyemi, O.D., Sote, E. O., Isiekwe, M. C. and Jones, S. P. (1997). Occlusal relationships and spacing or crowding of teeth in the dentitions of 3-4-year-old Nigerian children. International Journal of Paediatric Dentistry, 7(3), pp.155–160.

16. Nagham, H. Al-Sahaf. (2005). Spacing in the normal deciduous dentition among urban and rural Children in Baghdad Province. Iraqi Orthod J, 1(2), pp.13-17.

17. Prakash, B., Prakash, B., Krishna, G. B. and Bandana, K. (2014). Prevalence of occlusal traits in the deciduous dentition of children of Kaski district, Nepal. J Nepal Med Assoc, 52(195), pp.862-65.

18. Yadav, N.R., Prasad, S., Rajashekharappa, C.B. and Tandon, S. (2014). Gender influence on occlusal characteristics in the primary dentition. APOS Trends in Orthodontics, 4, pp.87-92.

19. Lochib, S., Indushekar, K.R., Saraf, BG., Sheoran, N. and Sardana, D. (2015). Occlusal characteristics and prevalence of associated dental anomalies in the primary dentition. Journal of Epidemiology and Global Health, 5, pp.151– 157.

20. Bhat, S.S., Rao, H.T.A., Hegde, K.S. and Kumar, B.S.K. (2012). Characteristics of Primary Dentition Occlusion in Preschool Children: an epidemiological study. International Journal Clinical Pediatric Dentistry, 5(2), pp.93-97.

21. Madhuri Vegesna, R., Chandrasekhar, and Vinay Chandrappa. (2014). Occlusal Characteristics and Spacing in Primary Dentition: a gender comparative cross-sectional study. International Scholarly Research Notices, Article ID 512680, pp.7.

22. Otuyemi, O.D., Sote, E. O., Isiekwe, M. C. and Jones, S. P. (1997). Occlusal relationships and spacing or crowding of teeth in the dentitions of 3-4-year-old Nigerian children. International Journal of Paediatric Dentistry, 7(3), pp.155–160.

23. Laila Baidas. (2010). Occlusion characteristics of primary dentition by age in a sample of Saudi preschool children. Pakistan Oral & Dental Journal, 30(2).