

Association between breastfeeding duration and mandibular retrusion: A cross-sectional study of children in the mixed dentition

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Introduction: In this study, we examined the relationships among breastfeeding duration, nonnutritive infantile sucking habits, Class II facial patterns with mandibular retrusion, and Class II dental relationships. **Methods:** A sample of 249 children in the mixed dentition was examined by 2 orthodontists. Data about the duration of breastfeeding and nonnutritive sucking habits were obtained by written questionnaires answered by the parents. **Results:** The chi-square test did not indicate a statistically significant association between breastfeeding duration and mandibular deficiency or Class II malocclusion. However, statistically significant associations were found between short breastfeeding duration (<6 months) and nonnutritive sucking habits, and between nonnutritive sucking habits and Class II malocclusions. **Conclusions:** These findings point to the hypothesis that nonnutritive sucking habits may work as a dominant variable in the relationship between breastfeeding duration and the occurrence of Class II malocclusion. However, the prevention of mandibular deficiency should not be listed as one of the advantages of breastfeeding. (*Am J Orthod Dentofacial Orthop* 2006;130:531-4)

The importance of breastfeeding on a child's life quality and health is well documented.¹⁻⁶ Breastfeeding is considered the best and safest way of feeding infants because of its positive effects on their physiological and psychological development.¹⁻³ Breast milk supplies all their nutritional needs, promotes proper immunological protection, and helps prevent chronic diseases and respiratory infections.⁴⁻⁶ Due to relevance of breastfeeding as a public health strategy, the World Health Organization (WHO) recommends that breastfeeding should be exclusive at least until 6 months of age and that health-care workers should promote natural nursing worldwide.⁷⁻⁹

Several authors suggested that breastfeeding, especially if prolonged, protects against malocclusion, stimulating sagittal growth of the mandible and a correct intermaxillary relationship through the mechanical stimulus of the facial muscles during sucking.^{2,10-23} However, until now, no evidence supports this associ-

ation. Legovic and Ostric²⁴ found no statistically significant differences in the frequencies of Class I and Class II malocclusions among breastfed and nonbreastfed children.

Mossey²⁵ stated that this phenotype is the result of both genetic and environmental factors and that evidence supports a significant genetic influence in many facial and occlusal variables, including mandibular length. On the other hand, Corrucini²⁶ showed that function plays the most important role in facial and occlusal features of civilized people and that heredity has only a secondary role in the etiology of most malocclusions.

Because of the unsettled questions concerning this subject, we investigated associations between breastfeeding duration and Class II facial pattern with mandibular retrusion in the mixed dentition.

MATERIAL AND METHODS

A cross-sectional study was performed in a sample of 249 Brazilian children in the mixed dentition. The group included students from 5 to 11 years of age (mean, 8.4 years) from 3 public schools in Rio de Janeiro, Brazil. The children were from low or medium socioeconomic conditions and various ethnicities. Sagittal facial patterns and interarch relationships were clinically examined under natural lighting by 2 orthodontists (kappa value >0.78) at the schools.

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Table I. Frequencies of Class II malocclusion, Class II facial pattern, and nonnutritive sucking habit according to breastfeeding duration

	Breastfeeding <6 mo	Breastfeeding ≥6 mo	Total
Class II malocclusion	25 (24.0%)	31 (21.4%)	56 (22.5%)
Non-Class II malocclusion	79 (76.0%)	114 (78.6%)	193 (77.5%)
Class II facial pattern	28 (26.9%)	27 (18.6%)	55 (22.1%)
Non-Class II facial pattern	76 (73.1%)	118 (81.4%)	194 (77.9%)
Sucking habit	84 (80.8%)	76 (52.4%)	160 (64.3%)
No sucking habit	20 (19.2%)	69 (47.6%)	89 (35.7%)

Table II. Associations tested

Association	Chi-square test	P	OR	95% CI for OR
Breastfeeding duration and Class II facial pattern	1.97	.16	1.61	0.88-2.94
Breastfeeding duration and Class II malocclusion	0.12	.73	1.16	0.64-2.12
Breastfeeding duration and nonnutritive sucking habit	19.99	.00*	3.81	2.12-6.86
Nonnutritive sucking habit and Class II facial pattern	1.76	.19	1.64	0.85-3.18
Nonnutritive sucking habit and Class II malocclusion	5.67	.02*	2.43	1.20-4.90

*Significant associations at $P < .05$.

The sagittal interarch relationship was classified according to the deciduous canine relationships as Angle Class I, Class II, or Class III.²⁷

The sagittal facial patterns were clinically evaluated according to the following criteria²⁸: Class I facial pattern—no discrepancy between jaws; Class II facial pattern—convex profile with discrepancy between jaws determined by mandibular retrusion or maxillary protrusion; Class III facial pattern—concave profile with a discrepancy between jaws determined by maxillary retrusion or mandibular protrusion.

Data regarding the duration of breastfeeding and nonnutritive sucking habits (thumb or pacifier) were obtained from written questionnaires answered by the parents.

The prevalences of various facial patterns and interarch relationships were described. The frequencies of breastfeeding duration for less and more than 6 months (minimum recommended by the World Health Organization) and nonnutritive sucking habits were calculated. A chi-square test ($P < .05$) was performed to verify associations between (1) breastfeeding duration and Class II facial pattern with mandibular retrusion, (2) breastfeeding duration and Class II malocclusion, (3) breastfeeding duration and prevalence of nonnutritive sucking habits, and (4) nonnutritive sucking habits and both Class II malocclusion and Class II facial pattern with mandibular retrusion. The odds ratio (OR) was calculated to measure the strength of the associations tested.

RESULTS

The prevalences of Angle Class II malocclusion and Class II facial pattern with mandibular retrusion were 22.5% and 22.1%, respectively. The frequency of breastfeeding for 6 months or more was 58.2%, and 41.8% of the subjects were breastfed for less than 6 months or not at all. Nonnutritive sucking habits occurred in 64.3% of the children.

The statistical analysis (chi-square test) indicated no significant association between breastfeeding duration and the prevalence of Class II facial patterns with mandibular retrusion. In addition, there was no significant association between breastfeeding duration and the prevalence of Class II malocclusions. However, the association between breastfeeding duration and nonnutritive sucking habits was significant (Tables I and II). The OR assessment showed that children breastfed for less than 6 months have an almost fourfold increased probability for developing sucking habits than children who were breastfed for 6 months or longer (Table II).

Nonnutritive sucking habits had a statistically significant association with Class II malocclusion (OR = 2.4), but not with Class II facial pattern (Tables II and III).

DISCUSSION

The roles played by genetics and environmental factors in the etiology of malocclusion have been discussed in the scientific literature. Many authors believe that breastfeeding and other environmental stimuli influence

Table III. Frequencies of Class II malocclusion and Class II facial pattern according to nonnutritive sucking habit

	<i>Sucking habit</i>	<i>No sucking habit</i>	<i>Total</i>
Class II malocclusion	44 (27.5%)	12 (13.5%)	56 (22.5%)
Non-Class II malocclusion	116 (72.5%)	77 (86.5%)	193 (77.5%)
Class II facial pattern	40 (25.0%)	15 (16.9%)	55 (22.1%)
Non-Class II facial pattern	120 (75.0%)	74 (83.1%)	194 (77.9%)

the growth and development of oral and facial structures through muscular activity.^{2,10-20,21,23,26,29} Others think that strong evidence supports genetics as the main etiological factor in the development of malocclusion and even muscle-activity patterns.^{25,30,31}

In this study, an association between breastfeeding duration and the prevalence of mandibular retrusion or Class II malocclusion was not observed. These findings do not agree with some authors who claimed that breastfeeding would provide mandibular development and adequate intermaxillary relationships, correcting the physiological mandibular retrusion observed in newborns.^{2,10-12,14,15,21,29} Previous reports on the relation between breastfeeding and mandibular development were short commentaries. Ours is the first study with a reasonable sample size to examine breastfeeding duration and facial patterns.

The discussion about the influence of breastfeeding on the development of a correct jaw relationship is complex. Josell,²⁰ Enlow et al,³⁰ Gama,³¹ and Larsson et al³² stated that genetics plays a major role in the development of the facial pattern. Mossey²⁵ and Profit³³ also suggested that environmental factors might aggravate Class II malocclusion tendencies that are genetically defined. In addition, Legovic and Ostric²⁴ concluded, in a study of Croatian children, that there are no significant differences in the prevalence of Class II malocclusion between breastfed and nonbreastfed subjects. Our results also do not support the idea that the environmental influence of breastfeeding plays an important role in mandibular development.

Children breastfed for less than 6 months had significantly more nonnutritive sucking habits. The association between the short duration of breastfeeding and the development of sucking habits was reported in previous studies and seems to develop in response to frustration and need for contact in these children.^{17,22,23}

The association between nonnutritive sucking habits and Class II facial pattern was not significant.

On the other hand, the results showed a statistically significant association between nonnutritive sucking habits and Class II malocclusions. These findings agree with Mossey²⁵ and Praetzel and Abrahão,²⁹ who suggested that facial growth patterns are genetically determined, whereas dentoalveolar structures are more influenced by external environment factors. To Corrucini,²⁶ although craniometric variables are highly inheritable, almost all occlusal variability is essentially acquired.

Our findings point to a hypothesis that nonnutritive sucking habits can work as a dominant variable in the relationship between breastfeeding duration and Class II malocclusions. If breastfeeding is shorter than 6 months, according to our findings, there is a fourfold likelihood that an infant will develop a nonnutritive sucking habit that could warp its occlusal relationship into an Angle Class II dysmorphology. Longitudinal studies with larger samples should further examine this hypothesis.

CONCLUSIONS

1. Class II facial patterns with mandibular retrusion were not associated with either breastfeeding duration or nonnutritive sucking habits.
2. There was an association between short (<6 months) breastfeeding and higher prevalence of nonnutritive sucking habits.
3. Nonnutritive sucking habits were associated with a higher prevalence of Angle Class II malocclusions.

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REFERENCES

1. American Academy of Pediatrics. Breastfeeding and the use of human milk. *Pediatrics* 1997;100:1035-9.
2. Davis DW, Bell PA. Infant feeding practices and occlusal outcomes: a longitudinal study. *J Can Dent Assoc* 1991;57:593-4.
3. Giugliani ERJ. Breastfeeding: how and why to promote it. *J Pediatr* 1994;70:138-51.
4. Newman J. How breast milk protects newborns. *Sci Am* 1995;4:76-9.
5. Primo C, Caetano LC. The decision to breastfeed: grandmother's view. *J Pediatr* 1999;75:449-55.
6. Ichisato MT, Shimo AKK. Revisiting early weaning through historical analysis. *Rev Latinoam Enfermagem* 2002;10:578-85.
7. World Health Organization. Protecting, promoting and supporting breastfeeding. Geneva:WHO 1989.
8. World Health Organization. Breastfeeding and the use of water and teas. Update 9, 1997.
9. Panamerican Health Organization. Breastfeeding. *IMCI Bulletin* 7, 2002.

10. Pastor I, Montanha K. Amamentação natural no desenvolvimento do sistema estomatognático. *Rev Odontoped* 1994;3:185-91.
11. Van Der Laan T. A importância da amamentação no desenvolvimento facial infantil. *Pró-Fono* 1995;7:3-5.
12. Carvalho GDA. Amamentação sob a visão funcional e clínica da odontologia. *Rev Secret* 1995;2:12-3.
13. Fagundes AA, Leite ICG. Breastfeeding and malocclusion: review of literature. *J Bras Fonoaudiol* 2001;2:229-32.
14. Sanches MTC. Clinical management of oral disorders in breast-feeding. *J Pediatr* 2004;80:155-62.
15. Medeiros EB, Rodrigues MJ. A importância da amamentação natural para o desenvolvimento do sistema estomatognático do bebê. *Rev Cons Reg Odontol Pernambuco* 2001;4:79-83.
16. Bradley RM. *Essentials of oral physiology*. St Louis: Mosby-Year Book; 1995.
17. Turgeon-O'Brien H, Lachapelle D, Gagnon PF, Larocque I, Maheu-Robert LF. Nutritive and nonnutritive sucking habits: a review. *J Dent Child* 1996;63:321-27.
18. Planas P. *Reabilitação neuro-oclusal*. Rio de Janeiro: Medsi; 1998.
19. Stevenson RD, Allaire JH. The development of normal feeding and swallowing. *Pediatr Clin North Am* 1991;38:1439-53.
20. Josell SD. Habits affecting dental and maxillofacial growth and development. *Dent Clin North Am* 1995;39:851-60.
21. Graber TM. Thumb and finger sucking. *Am J Orthod* 1959;45:259-69.
22. Serra-Negra JMC, Pordeus IA, Rocha JF Jr. Estudo da associação entre aleitamento, hábitos bucais e maloclusões. *Rev Odontol Univ São Paulo* 1997;11:79-86.
23. Karjalainen S, Rönning O, Lapinleimu H, Simell O. Association between early weaning, non-nutritive sucking habits and occlusal anomalies in 3-year-old Finnish children. *Int J Ped Dent* 1999;9:169-73.
24. Legovic M, Ostric L. The effects of feeding methods on the growth of jaws in infants. *J Dent Child* 1991;58:253-5.
25. Mossey PA. The heritability of malocclusion: part 2. The influence of genetics in malocclusion. *Br J Orthod* 1999;26:195-203.
26. Corruccini RS. How anthropology informs the orthodontics diagnosis of malocclusion's causes. Lewinston, Minn, Queenston, Canada, Lampeter, UK: Edwin Mellen Press; 1999.
27. Foster TD, Hamilton MC. Occlusion in the primary dentition: study of children at 21/2 to 3 years of age. *Br Dent J* 1969;126:76-9.
28. Capelozza Filho L. *Diagnóstico em ortodontia*. Maringá: Dental Press; 2004.
29. Praetzel JR, Abrahão M. Avaliação da modificação do perfil facial de bebês em relação ao sexo, raça, tipo de aleitamento e uso de chupeta. *J Bras Ortodon Ortop Facial* 1998;4:5-23.
30. Enlow DH, Harvold EP, Latham RA, Moffett BC, Christiansen RL, Hausch HG. Research on control of craniofacial morphogenesis: an NIDR state-of-the-art workshop. *Am J Orthod* 1977;71:509-30.
31. Gama FV. Amamentação e desenvolvimento: função e oclusão. *J Bras Ortod Ortop Maxilar* 1997;2:17-20.
32. Larsson E, Ögaard B, Lindsten R. Rearing of Swedish, Norwegian, and Norwegian Sami children. *Scand J Dent Res* 1993;101:382-5.
33. Proffit WR. *Contemporary orthodontics*. St Louis: Mosby, 2000.