Association between nonnutritive sucking habits and anterior open bite in the deciduous dentition of Japanese-Brazilians

Vivianne da Cunha Barbosa Sato*, Daniela Garib**, Hélio Scavone Jr.***, Rívea Inês Ferreira****

Abstract

Objective: Assess the association between nonnutritive sucking habits and anterior open bite in the deciduous dentition of Japanese-Brazilian children. **Methods:** 410 children of Japanese origin were assessed, 206 boys and 204 girls, between 2 and 6 years of age, in schools in São Paulo State, Brazil. Questionnaires concerning their nonnutritive sucking habits were sent to their legal guardians. Chi-square tests ($p<0.05$) were applied to assess the association between nonnutritive sucking habits and anterior open bite, and the logistic regression test to obtain the relative risk. **Results:** The prevalence of sucking habits found in the sample was of 44.6% and for the anterior open bite, 4.4%. There was a statistically significant association between anterior open bite and sucking habits (O.R.=10.77), persistence of sucking habits from 2 to 4 years old (O.R.=22.06), and the persistence of sucking habits from 4 to 6 years old (O.R.=17.31). As for the interruption period of the habit, the group that had interrupted the habit for a period equal or inferior to six months showed an increased prevalence of open bite compared to the group without this habit or in which the habit was interrupted for more than six months. **Conclusion:** Japanese-Brazilian children that had sucking habits have greater chance of acquiring anterior open bite in the deciduous dentition.

Keywords: Deciduous dentition. Malocclusion. Preventive orthodontics.

How to cite this article: Sato VCB, Garib D, Scavone Jr. H, Ferreira RI. Association between nonnutritive sucking habits and anterior open bite in the deciduous dentition of Japanese-Brazilians . Dental Press J Orthod. 2012 Jan-Feb;17(1):108-14.

» The author reports no commercial, proprietary, or financial interest in the products or companies described in this article.

* MSc and PhD in Orthodontics, UNICID.
** MSc, PhD and full professor in Orthodontics, Bauru Dental School-USP (FOB-USP). Associate Professor, HRAC-USP and FOB-USP.
*** MSc and PhD in Orthodontics, FOB-USP. Associate Professor, Masters Program in Orthodontics, UNICID.
**** MSc and PhD in Dental Radiology, FOP-UNICAMP. Associate Professor, Masters Program in Orthodontics, UNICID.

INTRODUCTION

Nonnutritive sucking habits must be seen as likely factors in the direct or indirect determination of dentoalveolar morphology disorder.

Specialized literature shows a cause-effect relation between sucking habits and anterior open bite in Caucasians. Various authors[5,7,8,17] have already positively correlated the presence of these habits and the above mentioned malocclusion. Some surveys[9,22] reported differences in the occlusal pattern, depending on the ethnical sample group. For this reason, it was considered appropriate to carry out a study with children from other ethnic groups to verify their occlusal features.

This epidemiological transverse study aimed to evaluate the finger and pacifier sucking habits in the deciduous dentition of Japanese-Brazilian children, as well as verify the associations of these habits and the presence of anterior open bite.

MATERIAL AND METHODS

This survey was developed in conformity with rules and standards under the Committee for Ethics in Scientific Researches of São Paulo University and before the beginning of the study a written consent form was obtained from the legal guardians.

Based on information from the Consulate of Japan, a list of Japanese-Brazilian preschools was put together in São Paulo State, Brazil. Thirty-six schools were picked out from this list to accomplish the minimal number estimated by the sample calculation for this randomized case-control study. The sample error was 4.9%, placed below the acceptable interval of 6% to 10%. Thus 410 Japanese-Brazilian children were assessed, 206 boys and 204 girls, from 2 to 6 years of age.

The children assessed in this study followed the criteria as described below:

- They were born in Brazil with a minimum 50% direct Japanese origin, i.e., they should have at least one of the parents, two grandparents and four great grand-parents, either on their mother's or their father's side, born in Japan.
- Complete deciduous dentition,[21] without presence of permanent teeth.
- Absence of large caries or big crown damages.
- Absence of dental disorders in shape, number, structure or eruption.
- Absence of syndromes, or cleft lip and palate.
- No previous orthodontic treatment or speech therapy.

The total sample (410 children) was subdivided into a Control Group (CG) and an Experimental Group (EG). The Control Group encompassed all the children who did not display any finger and/or pacifier sucking habit, which totalled 227 children. However, the Experimental Group was composed of 183 children that had one or more sucking habit, either at the moment of the clinical assessment or sometime in the past. The characterization of these groups can be observed in Table 1.

After, the Experimental Group was subdivided in three subgroups, concerning the length of time in which these habits persisted. In subgroup 1 (SG1) these habits were kept up to 2 years old. In subgroup 2 (SG2) they persisted in an interval between 2 and 4 years old. In subgroup 3 (SG3) those habits were active from 4 to 6 years old.

TABLE 1 - Distribution in number (n) and percentage (%) of the assessed sample according to gender in the Control and Experimental Groups.

Group	Gender				Total sample	
	male		female			
	n	%	n	%	n	%
Control (no habit)	125	55.1	102	44.9	227	100.0
Experimental (with habit)	81	44.3	102	55.7	183	100.0
Total	206	50.2	204	49.8	410	100.0

Concomitantly to the previous subdivision criteria, the time of the habit interruption was used, leading to the formation of two additional subgroups. In subgroup A (SGA) the children exhibited the habits at the moment of clinical assessment, or they had interrupted them in the last 6 months. However, in subgroup B (SGB) the habits had been interrupted more than 6 months ago.

Examiner's calibration

In order to promote the examiner's calibration, a training session was performed in one of the sample schools under the orientation of an experienced examiner. In the second phase, a fortnight afterwards, assessments were performed in order to evaluate the degree of intra-examiner agreement attained after the aforementioned calibration. The results were compared to the statistic Kappa test. The first and second clinical assessments presented a Kappa index of 0.94 for overbite, demonstrating an almost perfect agreement.

Criteria for the clinical assessment

The clinical assessment consisted of a visual inspection in the school itself. The child sat under clear light. For the identification of the presence or absence of anterior open bite the following criteria were used:

» Absence of anterior open bite: The incisal borders of the upper central incisors overlaped or were in the same vertical level of the lower incisal borders

» Presence of anterior open bite: Existence of a vertical opening between the incisal borders of the upper and lower incisors.

Assessment of the presence of oral habits

The presence of nonnutritive sucking habits was investigated through a questionnaire delivered to the guardian of each assessed child.

The information allowed determining the age in which the children interrupted the habit, as well as the interval between the interruption and the clinical assessment done for the survey.

Method for the analysis of the results

Initially the prevalence of the finger sucking and use of pacifier, as well as the identification of occlusal irregularity were calculated in the total sample. Then, univariate analysis was assessed through Pearson Chi-square tests ($p<0.05$) to evaluate the association between the interruption of the habits and the prevalence of the investigated occlusal feature. For the identification of risk factors for the development of specific malocclusions, with $p<0.05$, a stepwise multiple logistic regression analysis was performed. Variables that presented significant association with the malocclusion were selected. A logistic regression model was adjusted which estimated the odds ratio (O.R.) with confidence intervals at 95%.

RESULTS

According to Table 2, the prevalence of nonnutritive sucking habits was high. Out of the 410 studied children, 126 (30.7%) presented pacifier use habit, 45 (11%) finger sucking, 12 (2.9%) both habits and 227 (55.4%) didn't have any of those habits.

Tables 3 and 4 show data on the association between sucking habits and anterior open bite. Out of 183 children who displayed some kind of sucking habit, 8.7% presented anterior

TABLE 2 - Prevalence of sucking habits in the studied sample.

Habits	2 to 4 years		4 to 6 years		2 to 6 years	
	n	%	n	%	n	%
Pacifier	77	29.3	49	33.3	126	30.7
Finger	28	10.6	17	11.6	45	11.0
Pacifier + Finger	7	2.7	5	3.4	12	2.9
Without habit	151	57.4	76	51.7	227	55.4
Total	263	100.0	147	100.0	410	100.0

open bite and 91.3% absence of anterior open bite. However, out of the 227 children who didn't have a sucking habit, 0.9% presented anterior open bite and 99.1% absence of anterior open bite. The X^2 value for this association was equivalent to 14,92 (p=0.000). Therefore there were significant differences between the control and experimental groups related to the presence of anterior open bite (Table 4). The odds ratio was 10.77 (p=0.002).

On Tables 5 and 6, results of the association concerning the presence of anterior open bite related to the age of the sucking habits persistence are presented. It was verified that the anterior open bite presented a similar prevalence between the Control Group (CG) and Subgroup 1 (SG1), including the children who kept the sucking habit up to 2 years old. Nevertheless, the subgroups 2 and 3 revealed a considerably higher prevalence for anterior open bite. The statistical analysis of this association showed that the difference was significant among CG and SG2; CG and SG3; and between SG1 and SG2. Children with the persistence of the habit from 2 to 4 years old presented 22.06 times (p=0.000) more chances of acquiring anterior open bite than the children who didn't have these habits. The children whose habits persisted from 4 to 6 years old, presented 17.31 times (p=0.000) more chances of acquiring this malocclusion also when compared to CG. When SG1 and SG2 were analyzed, children in the latter had 5.04 more (p=0.009) chances of presenting anterior open bite (Table 6).

Tables 7 and 8 expose the results of the association between the prevalence of anterior open bite and the interruption time of the sucking habit. It was verified that the prevalence of the anterior open bite was higher in Subgroup A (25.9%), with present or interrupted habits in the last 6 months, while Subgroup B, with interrupted habit for more than 6 months, showed an accentuated reduction in the prevalence of this malocclusion (1.6%), almost similar to the frequency of CG (0.9%).

TABLE 3 - Prevalence of anterior open bite (AO) related to the presence or absence of nonnutritive sucking habits in Japanese-Brazilian children.

Groups	Presence of AO		Absence of AO		Total	
	n	%	n	%	n	%
Experimental (with habits)	16	8.7	167	91.3	183	100.0
Control (no habits)	2	0.9	225	99.1	227	100.0
Total	18	4.4	392	95.6	410	100.0

TABLE 4 - Statistic analysis according to Chi-square (X^2) test and the Logistic Regression (O.R.), for the comparison between control and experimental groups as to the prevalence of anterior open bite.

Comparisons	X^2	p	O.R.	P
Control/ Experimental	14.92	0.000	10.77	0.002

TABLE 5 - Prevalence of anterior open bite (AO) according to the age of persistence of the nonnutritive oral sucking habit.

Age of persistence	Presence of AO		Absence of AO		Total	
	n	%	n	%	n	%
SG1 (<2 years)	4	3.7	103	96.3	107	100.0
SG2 (>2, <4 years)	10	16.4	51	83.6	61	100.0
SG3 (>4, <6 years)	2	13.3	13	86.7	15	100.0
CG (no habits)	2	0.9	225	99.1	227	100.0
Total	18	4.4	392	95.6	410	100.0

TABLE 6 - Analysis of the statistic significance according to Chi-square (X^2) and the logistic regression (O.R.), for the comparison among the subgroups 1, 2, 3 and control group as to the presence of anterior open bite related to the age of finger/pacifier sucking habit in children of both genders (total sample).

Comparisons	X^2	p	O.R.	P
CG x SG1	3.37	0.067	-	-
CG x SG2	28.97	0.000	22.06	0.000
CG x SG3	13.42	0.000	17.31	0.006
SG1 x SG2	8.15	0.004	5.04	0.009
SG1 x SG3	2.59	0.108	-	-
SG2 x SG3	0.08	0.771	-	-

TABLE 7 - Prevalence of anterior open bite according to interruption time of the nonnutritive sucking habit in Japanese-Brazilian children.

Group	Presence of AO		Absence of AO		Total	
	n	%	n	%	n	%
Subgroup A	14	25.9	40	74.1	54	100.0
Subgroup B	2	1.6	127	98.4	129	100.0
Control Group	2	0.9	225	99.1	227	100.0

Subgroup A: Present habit or interrupted in the last 6 months. Subgroup B: Interrupted habit for more than 6 months. Control Group: Children without sucking habits.

TABLE 8 - Analysis of the statistic significance according to Chi-square (X^2) and the logistic regression (O.R.), for the comparison between the subgroups A and B and Control Group as to the prevalence of anterior open bite related to the period of finger/pacifier sucking habit in children of both genders (total sample).

Comparisons	X^2	p	O.R.	P
Control Group x Subgroup A	50.95	0.000	39.37	0.000
Control Group x Subgroup B	0.33	0.565	—	—
Subgroup A x Subgroup B	28.34	0.000	22.25	0.000

A significant statistic difference was found (Table 8) between Subgroup A and CG; and between Subgroup A and Subgroup B. The children in Subgroup A showed a risk 39.37 (p = 0.000) times higher than the children in CG and a risk 22.25 (p = 0.000) times higher than the children in Subgroup B of presenting anterior open bite.

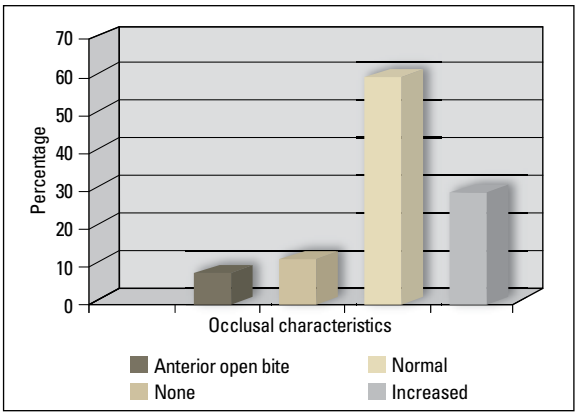

FIGURE 1 - Prevalence of the types of overbite in the sample.

DISCUSSION

The harmful influence of oral habits on the occurrence of malocclusions has been reported in epidemiological studies.[5,16,20] In this study it was observed that 44.6% of children had a history of deleterious sucking habits (Table 2). Similar values are found in the literature.[15,18] However there are reports of much higher frequencies such as 75.9%,[2] 78%,[11] 64%,[16] 59%,[23] 65%.[10] Low frequency, around 25% was also described[13] and can be explained by the longitudinal character of the study, where mothers, from pregnancy, were oriented about the deleterious habits and about the benefits of breast-feeding. Another two studies[8,22] with low prevalence were performed in Japan with results of 19.8% and 21.75%. These studies obtained lower frequencies because in that country the use of pacifier is not as widespread as finger suction.

Most of the studies focus on the prevalence of anterior open bite in Caucasian children and show prevalence over 16.50%.[1]

Nevertheless, a study performed in a rural community in Finland[12] obtained a low prevalence (6.4%) close to the one found in this study (4.4%) (Fig 1). This can be explained by the restrict access to the pacifier in that location, one of the possible causes of the malocclusion. The only report in the literature using a Japanese-Brazilian sample[19] showed a similar result (4.51%) to the present study. It didn't differ significantly from the prevalence of 7.7% found in another study performed in Japan.[8] These lower prevalence should be attributed to the lower incidence of deleterious sucking habits in the Japanese ethnic group previously discussed, which some authors[5,19,20] believe

to be the cause of this malocclusion. It should be highlighted that the Japanese facial pattern can also be a contributing factor for the low prevalence of anterior open bite in this ethnic group.

The results of the present study showed statistically significant association (p=0.000) between the finger/pacifier sucking and anterior open bite (Tables 3 and 4) corroborating previous studies.[3,4,8,13,16,20,22] The relative risk observed for anterior open bite in children with deleterious sucking habits was 10 times higher (p=10.77) than those who did not have this behavior. Serra-Negra, Pordeus and Rocha Jr.[16] found a risk close to that (O.R.=14.1). When assessing the association between the age of sucking habit persistence and the presence of anterior open bite, results point out that children who persisted on the habit after they were 2 years old presented a higher prevalence of malocclusion (Tables 5 and 6). Yonesu et al[22] found statistically significant differences in the prevalence of anterior open bite when the habit persisted above 3 years of age. This statistic difference between the studies can be explained by the grouping done in the sample, not by age, as in the Japanese study, but by age range, as the 3-year-old children were included in the 2 to 4 year-old range.

The period of habit interruption was studied and it was verified that children who interrupted the habit for more than 6 months did not present statistically significant differences compared to the group which never had the habit (CG) as for the presence of anterior open bite (Tables 7 and 8). This result suggests the occurrence of self-correction of this kind of malocclusion in children who interrupted the habit for more than 6 months, as previously described in the literature.[14]

CONCLUSIONS

The prevalence of deleterious sucking habits in Japanese-Brazilian children was equivalent to 30.7% for pacifier sucking, 11% for finger sucking, 2.9% for finger and pacifier sucking; 55.4% of the children did not have a sucking habit.

Children who present a sucking habit have more chance of having anterior open bite on their deciduous dentition than those who never displayed a sucking habit.

REFERENCES

1. Adair SM, Milano M, Dushku JC. Evaluation of effects of orthodontic pacifiers on the primary dentitions of 24 to 59 month old children: preliminary study. Pediatr Dent. 1992; 14(1):13-8.
2. Bowden BD. A longitudinal study of the effects of digit and dummy sucking. Am J Orthod. 1966;52(12):887-901.
3. Chevitarese AB, Della Valle D, Moreira TC. Prevalence of malocclusion in 4-6 year old Brazilian children. J Clin Pediatr Dent. 2002 Fall;27(1):81-5.
4. Emmerich A, Fonseca L, Elias AM, Medeiros UV. Relação entre hábitos bucais, alterações oronasofaringianas e mal-oclusões em pré-escolares de Vitória, Espírito Santo, Brasil. Cad Saúde Pública. 2004; 20(3):689-97.
5. Estripeaut LE, Henriques JFC, Almeida RR. Hábito de sucção do polegar e má oclusão: apresentação de um caso clínico. Rev Odontol Univ São Paulo. 1989;3(2):371-6.
6. Freitas JAS, Alvares LC, Freitas SMZ, Kawauchi MY. Aspectos da dentição permanente em crianças nipo-brasileiras. Ortodontia. 1991;24(2):14-24.
7. Forte FDS, Bosco VL. Prevalência de mordida aberta anterior e sua relação com hábitos de sucção não nutritiva. Pesq Bras em Odontoped Clín Integr. 2001;1(1):3-8.
8. Fukuta O, Braham RL, Yokoi K, Kurosu K. Damage to the primary dentition resulting from thumb and finger (digit) sucking. ASDC J Dent Child. 1996 ;63(6):403-7.
9. Isshiki Y, Yamagushi H, Yatabe K, Kitafusa Y, Kawamura M, Kanematsu K. Longitudinal studies of dental models, especially on the occlusion of deciduous dentition of three year old children. J Tokyo Dent Coll. 1969;70(1):113-29.
10. Katz CRT, Rosenblatt A, Gondim PPC. Hábitos de sucção, padrão de crescimento facial e alterações oclusais dentárias em pré-escolares do Recife – PE. J Bras Ortodon Ortop Facial. 2002;7(40):306-13.
11. Lindner A, Modéer T. Relation between sucking habits and dental characteristics in preschool children with unilateral crossbite. Scand J Dent Res. 1989;97(3):278-83.
12. Myllärniemi S. Malocclusion in Finnish rural children: an epidemiological study of different stages of dental development. Suom Hammaslaak Toim. 1970;66(5):219-64.
13. Paunio P, Rautava P, Sillanpää M. The Finnish family competence study: the effects of living conditions on sucking habits in 3-year-old Finnish children and the association between these habits and dental occlusion. Acta Odontol Scand. 1993;51(1):23-9.
14. Proffit WR, Fields Jr HW. Ortodontia contemporânea. 2. ed. Rio de Janeiro: Guanabara Koogan; 1995.
15. Santana VC, Santos RM, Silva LAS, Novais SMA. Prevalência de mordida aberta anterior e hábitos bucais indesejáveis em crianças de 3 a 6 anos incompletos na cidade de Aracaju. J B Odont Odontopediatria. 2001;4(18):153-60.
16. Serra-Negra JMC, Pordeus IA, Rocha Jr JFR. Estudo da associação entre aleitamento, hábitos bucais e maloclusões. Rev Odontol Univ São Paulo. 1997;11(2):79-86.
17. Tanoue MSM. Prevalência dos hábitos bucais de sucção e suas possíveis associações com os diversos tipos de trespasse vertical interincisivos, na fase da dentadura decídua, dos quatro aos seis anos de idade [dissertação]. São Paulo (SP): Universidade Cidade de São Paulo; 2002.
18. Valente A, Mussolino ZM. Freqüência de sobressaliência, sobremordida e mordida aberta na dentição decídua. Rev Odont Univ São Paulo. 1989;3(3):402-6.
19. Vieira ACG, Scavone Junior H, Nahás ACR, Ferreira FAC, Corotti KV, Quaglio CL. Estudo da prevalência do trespasse vertical interincisivos na dentadura decídua, dos dois aos seis anos de idade, em nipo-brasileiros. Rev Odontol Unicid. 2004;16(2):149-58.
20. Vis H, Boever A, Cauwenberghe PV. Epidemiologic survey of functional conditions os the masticatory system in Belgian children aged 3-6 years. Community Dent Oral Epidemiol. 1984 Jun;12(3):203-7.
21. Vono AZ. Estudo da cronologia e seqüência de erupção dos dentes decíduos em crianças leucodermas brasileiras, de Bauru, Estado de São Paulo [dissertação]. Bauru (SP): Universidade São Paulo; 1972.
22. Yonezu T, Kurosu M, Ushida N, Yakusiji M. Effects of prolonged non-nutritive sucking on occlusal characteristics in the primary dentition. Dent Jap. 2005;41:107-12.
23. Zuanon ACC, Oliveira MF, Giro EMA, Maia JP. Relationship between oral habits and malocclusion in the primary teeth. J Bras Odontopediatr Odontol Bebê. 1999;3(12):104-8.

Submitted: January 8, 2008
Revised and accepted: December 13, 2009

Contact address
Vivianne da Cunha Barbosa Sato
Rua Catarina Braida, 359, apt. 22, bloco 6
Zip code: 03.169-030 – São Paulo/SP, Brazil
E-mail: vivisato@gmail.com