

Anterior open bite and deleterious habits in preschool children from public schools

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• **Conflicts of interest:** none declared.

ABSTRACT

Objective: this study aims to evaluate the prevalence of anterior open bite and its association with deleterious oral habits, such as use of pacifier, finger-sucking habit and baby bottle in preschool children. **Material and Methods:** a cross-sectional study was carried out with 142 children, aged three to five years old, from 9 schools in the city of Nova Venécia, ES, Brazil. A properly calibrated examiner conducted the examination of occlusion under natural light and with the aid of medical examination stick. In addition, a semi-structured form with closed questions on deleterious oral habits in children was sent to parents/guardians. The sociodemographic, economic and anterior open bite data was verified through the Fisher exact test and the odds ratio values were calculated with 95% confidence interval. **Results:** it was found a prevalence of 31.69% (45) of anterior open bite. Moreover, 45.8% (65) of the children had a pacifier sucking habit, 14.8% (21) finger sucking habit and 73.9% (105) used baby bottle. Children with habit of pacifier sucking showed 5.58 (2.54-12.24) more likely to have anterior open bite than children without the habit. Preschool children with finger sucking habit showed 3.55 (1.37-9.21) more likely to have malocclusion. Children who used baby bottle presented 2.29 (1.06-4.97) more likely to have anterior open bite. **Conclusion:** high prevalence of anterior open bite is observed in the studied population and it is associated with the pacifier sucking habit, finger sucking habit and use of a baby bottle.

Keywords: Pediatric dentistry, Open bite, Oral habits, Children.

Introduction

Muscle imbalances arising from the so-called “deleterious oral habits”, during the period of facial growth, have been shown to be able to disrupt the normal development of the dental occlusion, compromising the morphology and function of this intricate stomatognathic system.¹ The clinical observations reinforce the believed concept of the direct form-function relationship.¹

For many authors, the anterior open bite is the most frequent malocclusion²⁻⁴ and is associated with a negative impact on the life quality between preschool children and their families.⁵

In Brazil, the prevalence of anterior open bite is high, range from 12% to 21%,^{2,3,6-8} so it is important to perform studies to identify the factors associated in order to encourage preventive policies.^{8,9}

In this sense, this research aimed to evaluate the presence of anterior open bite in children aged three to five years from public schools and its relation with deleterious oral habits.

Material and Methods

Following the approval by the Ethics and Research Committee of the Federal University of Espírito Santo (UFES) (201/09 Protocol), a cross-sectional study was conducted in public schools in the urban area of the city of Nova Venécia,

Espírito Santo, from November 2009 to May 2010.

Children aged three to five years enrolled in the public schools included in the study were invited to participate in this research. All the municipal public schools of the city were selected, which had a total of 551 enrolled students in this age group.

To carry out the sample size calculation, we used a prevalence of 20%,¹¹ confidence level of 95% and an error margin of 5% of a population of 3728 children, data from Census of IBGE (2010). The calculation resulted in the number 231, to which we add 20% to compensate for possible losses.

Based on the daily frequency list of the schools, it was made the numbering of each student, from which was done a drawing of 290 children to participate in the study, through systematic sampling technique with interval of 2.

Only children who met the following inclusion criteria were considered eligible: full deciduous dentition and children whose parents or guardians signed the informed consent. In addition, children with absence of some deciduous tooth or even with early tooth losses were excluded from the study.

Initially, clinical examinations were carried out in schools, by a dentist and a script trained assistant. The intra-examiner agreement degree was evaluated through 20 evaluations on duplicate, which correspond to 14% of the number of children in the sample (95% intra-examiner

agreement) and these data are not present in this study.

The examination was carried out after brushing, with the child sitting in front of the examiner, under natural light. The setting of the examinations was similar for all children evaluated, i.e. the physical location, environmental conditions, aspects regarding the diagnostic criteria and data recording were similar.

For recording the anterior open bite, it was used the tactile-visual examination with aid of a medical examination stick and was performed with the child sitting in front of the examiner, under natural light. For the definition of anterior open bite, the child occluding in centric occlusion with no apprehension of the stick by deciduous teeth.

Information on the demographic condition (gender, age, education of the legal responsible and socioeconomic class (Brazilian minimum wage (BMW) - currently at R\$ 937.00) of the children evaluated were collected through a questionnaire with closed answers sent to parents or guardians together with the informed consent. Data related to breastfeeding, bottle-feeding, finger sucking and pacifier sucking habits were also collected. The education level of the mother was used to analyze the socioeconomic condition.

The collected data were subjected to analytical descriptive statistical analysis. The association between sociodemographic, economic and habits with anterior open bite data was verified through the Fisher exact test. The significance level adopted in all the analyses was 5% and the odds ratio values were calculated with 95% confidence interval. The analyses were conducted in the statistical package SPSS-Statistical Package for Social Science, version 15.

Results

A total of 290 children were selected for the study, there was return of 142 questionnaires and consent forms signed, and the final number of 142 survey participants. In our study, a low response rate was found for the questionnaires sent (48.9%). It is important to note that low response rates are suggested as one of the factors that attribute sampling bias, known as selective non-response bias.

It was found a prevalence of 31.69% (45) of anterior open bite. The sample showed a mean age of 4.2 years old (standard deviation 0.7).

The prevalence of finger sucking and pacifier sucking are shown in Figure 1. The answers to the questionnaires show that 65 (45.8%) children use or used a pacifier and 77 (54.2%) children who never used pacifiers, while 21 children (14.8%) had the finger sucking habit and 121 (85.2%) children had not this habit. The baby bottle habit was found in 105 (73.9%) children. Furthermore, it was also found that 49 (34,5%) children had more than one habit.

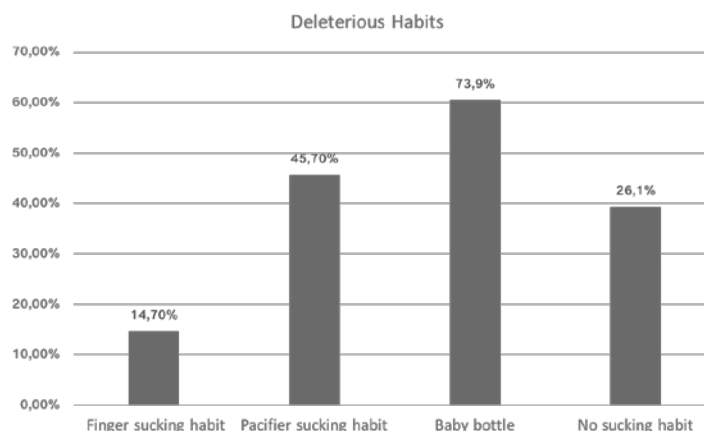


Figure 1. Prevalence of the deleterious habits (attached)

Table 1 shows that it was found no statistically significant relationship between anterior open bite and gender variables, as well as between anterior open bite and guardian's education and also between the anterior open bite and socioeconomic status. It found no significant relationship in these analyzes.

Table 1. Socio-demographic data for study group in relation to the anterior open bite

Feature	No Anterior Open Bite	Anterior Open Bite	p-valor
	n %	n %	
Gender			
Female	47 67.1	23 32.9	0.454
Male	50 69.4	22 30.6	0.179
Education of the responsible			
< 8 years	57 72.2	22 27.8	0.230
≥ 8 years	40 63.5	23 36.5	
Socioeconomic class (BMW)			
< 2 BMW	19 61.3	12 38.7	
> 2 BMW	78 70.3	13 29.7	

Notes: P-value by Fisher's exact test. *Significant at $p < 0.05$.

However, Table 2 shows the odds ratio of children who used pacifiers, sucked finger and baby bottle to present anterior open bite. Children with pacifier sucking habit are 5.586 (IC 95% 2.549-12.242) times more likely to present anterior open bite than children who do not use a pacifier, while those with finger sucking habit are 3.556 (IC 95% 1.372- 9.215) times more likely to present anterior open bite than children who do not have this habit. It was possible to verify that both pacifier and finger habits are associated with anterior open bite.

Table 2. Data on pacifier and finger sucking habits in relation to the anterior open bite

Feature	Anterior Open Bite					p-value	Odds Ratio	Confidence Interval
	Yes		No		Total			
	n	%	n	%				
Pacifier Sucking Habit								
Yes	33	50.8	32	49.2	65			
No	12	15.6	65	84.4	77	p<0.001*	5.586	(2.549 -12.242)
Total	45		97		142			
Finger Sucking Habit								
Yes	12	57.1	9	42.9	21			
No	33	27.3	88	72.7	121	0.008*	3.556	(1.372 – 9.215)
Total	45		97		142			
Baby Bottle								
Yes	66	62.9	31	83.8	97	0.014*	2.290	(1.057 – 4.964)
Nos	38	37.1	6	16.2	46			
Total	83		37		142			

Notes: P-value by Fisher’s exact test. *Significant at p< 0.05.

Discussion

This study found a prevalence of the anterior open bite of 31.69%, corroborating with previous studies;^{4,5,8,10} while other studies conducted in the State of Espírito Santo found prevalence of the anterior open bite around 20%¹¹ Moreover, finger sucking promotes several changes in dentition, perioral muscles and occlusion, highlighting anterior open bite.¹⁰⁻¹³ Similarly, the pacifier sucking shows similar changes, however the appearance of the anterior open bite is more circular.^{1,12} Some authors believe that undesirable or deleterious oral habits, in which are included the pacifier sucking and finger sucking, are potentially causes of malocclusion.^{6,13}

Moreover, in this survey almost half sample (45.8%) use or have used a pacifier and only 14.8% of children had the finger sucking habit. It is known that this type of habit is the most prevalent in the preschool children.^{15,16}

In the present study, there was no statistically significant relationship between the anterior open bite and gender variables, corroborating with the various previous studies.^{7,8,16} However, Carvalho *et al.*⁵ found a statistically significant association between the anterior open bite and boys. We believe that in our findings, this relationship was not present due to culture and habits among children are close, regardless of gender. However, this relationship was not the goal of our research.

Our data shown no relationship between guardians education and socioeconomic variables to the presence of anterior open bite, in the present study. It is possible to suggest

a tendency of homogenized knowledge among the participants in this field. A research carried out in Finland,¹⁴ showed different results, once the socioeconomic level of the mothers of the pacifier users did not differ from the children without sucking habit. The finger suckers belonged to families of lower socioeconomic status, and neither parent had university educational level.

However, another study conducted in Brazil,¹⁷ noted that children belonging to non-favored social class are almost three times (OR = 2.8) more likely to remain with the pacifier sucking habit longer than favored class children. The reason for this divergence may be the sample coming only from public schools, since this may influence these findings.

Another limitation of this study was a low rate of response by the children’s guardians, since part of them did not return the questionnaire in a timely manner, which is a recurring fact in studies with this form of approach.

In the best of our knowledge, malocclusions are highly prevalent events and may impact the quality of life of children. The delay in diagnosis of anterior open bite and no correct intervention will possibly perpetuate to the mixed dentition and lead to future difficulties for the resolution.²⁻⁴

Conclusion

High prevalence of anterior open bite is observed in the studied population and it is associated with the pacifier sucking habit, finger sucking habit and use of a baby bottle.

References

- Silva Filho OG da, Okada T, Santos Sd. Dos. Sucção digital: abordagem multidisciplinar: ortodontia x psicologia x fonoaudiologia. *Estomat Cult Bauru*.1986;16(2):44-52.
 - Machado DB, Brizon VSC, Ambrosano GMB, Madureira DF, Gomes VE, Oliveira ACB. Factors associated with the prevalence of anterior open bite among preschool children: A population-based study in Brazil. *Dental Press J Orthod*. 2014; 19(5):103-9.
 - Carvalho AC, Paiva SM, Scarpelli AC, Viegas CM, Ferreira FM, Pordeus IA. Prevalence of malocclusion in primary dentition in a population-based sample of Brazilian preschool children. *Eur J Paediatr Dent*. 2011;12(2):107-11.
 - Silvestrini-Biavati A, Salamone S, Silvestrini-Biavati F, Agostino P, Ugolini A. Anterior open-bite and sucking habits in Italian preschool children. *Eur J Paediatr Dent*. 2016;17(1):43-6.
 - Ramos-Jorge J, Motta T, Marques LS, Paiva SM, Ramos Jorge ML. Association between anterior open bite and impact on quality of life of preschool children. *Braz Oral Res*. 2015;29(1):56-8.
 - Carvalho CM, Carvalho LFP, Forte FDS, Aragão MS, Lino JC. Prevalência de mordida aberta anterior em crianças de 3 a 5 anos em Cabedelo/PB e relação com hábitos bucais deletérios. *Pesq Bras Odontoped Clin Integr*. 2009;9(2):205-10.
 - Cotrim LC, Venancio SI, Loureiro MM. *Rev Bras Saúde Matern Infant*. 2002;2(3):245-52.
 - Fernandes KP, Amaral MT. Frequência de maloclusões em escolares na faixa etária de 3 a 6 anos, Niterói, Brasil. *Pesq Bras Odontoped Clin Integr*. 2008;8(2):147-51.
 - Iwasa EAP, Sousa MIR, Cypriano S. Prevalência de alterações oclusais da dentição permanente em escolares de 12 anos da região de Campinas, SP. *Rev Fac Odontologia - Passo Fundo*. 2003;8(2):40-4.
 - Mendes ACR, Valença MG, Lima CCM. Associação entre aleitamento, hábitos de sucção não-nutritivos e maloclusões em crianças de 3 a 5 anos. *Cienc Odontol Bras*. 2008;11(1):67-75.
 - Miotto MHMB, Cavalcante WS, Godoy LM, Campos DMKS, Barcelos LA. Prevalência de mordida aberta anterior associada a hábitos orais deletérios em crianças de 3 a 5 anos de Vitória, ES. *Rev CEFAC*. 2014;16(4):1303-10.
 - Almeida RR, Ursi WJS. Anterior open bite: etiology and treatment. *Oral Health*. 1990;80(1):27-31.
 - Queluz DP, Aidar JM. Chupeta: um hábito nocivo? *Rev JBP*. 1999;2(8):321-33.
 - 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.
 - Maciel CTV, Leite ICG. Aspectos etiológicos da mordida aberta anterior e suas implicações nas funções orofaciais. *Pró-Fono R Atual Cient*. 2005;17(3):201-7.
 - Rochelle IMF, Tagliaferro EPS, Pereira AC, Meneghim MC, Nóbilo KA, Ambrosano GMB. Amamentação, hábitos bucais deletérios e oclusopatias em crianças de cinco anos de idade em São Pedro, SP. *Dental Press J. Orthod*. 2010;15(2):71-81.
 - Zuanon ACC. Influência da amamentação natural e artificial no desenvolvimento de hábitos bucais. *Rev. JBP*. 1999;2(8):303-6.
 - Serra-Negra JMC, Pordeus IA, Horta P, Okano S, Ferreira SCV. O uso de chupeta por crianças – relato de mães. *Rev. JBP*. 1999;2(7):211-7.
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Mini Curriculum and Author's Contribution

- Valchia Gotardo Gusson Colombi – DDS, MSc. Contribution: performed the data collection and wrote the manuscript.
 - Rafael Celestino Souza – DDS, MSc and PhD. Coordinator of Special Care Dentistry Course, Dental Research Center São Leopoldo Mandic. Contribution: contributed substantially to all parts of manuscript.
 - Maria Helena Monteiro Barros Miotto – DDS and MSc. Contribution: experimental design, proofread the manuscript.
 - Isabela Floriano – DDS, MSc and PhD. Professor of Pediatric Dentistry Post-Graduation, Dental Research Center São Leopoldo Mandic. Contribution: contributed substantially to discussion.
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 - Elisa Cristina Gnoatto – DDS, MSc. Contribution: performed the data collection.
 - José Carlos Petrorossi Imparato – DDS, MSc, PhD. Associate Professor of Master Courses from Dental Research Center São Leopoldo Mandic. Contribution: experimental design, proofread the manuscript.
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