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Original Article

## Prevalence of Posterior Cross Bite in 3-5-Year-Old Children from Vitória, Brazil

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### Abstract

**Objective:** To evaluate the prevalence of posterior cross bite and the possible association with deleterious oral habits in 3-5-year-old children from Vitória, Espírito Santo, Brazil. **Material and Methods:** This retrospective observational study with a longitudinal design used as parameters for sample calculation prevalence of 35%, confidence level of 95% and error of 5%. The final random sample included 903 children, proportionally distributed according to the number of children enrolled per school. Thus, the representative sample of 9,829 children enrolled in public schools of Vitória was guaranteed. A questionnaire with six open and eighteen closed items was used to collect data on socioeconomic status, age, sex and deleterious habits. Clinical exams were carried out by trained examiners (Kappa 0.86) for posterior cross bite diagnosis. The association between variables was verified by the Chi-Square Test and Fisher Exact Test. Odds Ratio evaluated the association strength. This research was approved by the UFES Ethics Research Committee. **Results:** The prevalence of cross bite was of 16.2% and children that used pacifier were two times more likely to develop posterior cross bite (OR = 1.775; CI 95% = 1.242; 2.537). **Conclusion:** The prevalence of posterior cross bite was expressive, and thumb sucking and pacifier use were considered risk factors. Association was verified with the habit of using pacifier, increasing twice the likelihood of presenting malocclusion and posterior cross bite.

**Keywords:** Posterior Cross Bite; Malocclusion; Habits.

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## Introduction

The decline in the prevalence of dental caries in recent years in children and adolescents [1] has enabled the dentist greater attention to other oral problems including dental occlusion [2]. In particular, malocclusions have high prevalence at the age of 5 years, occupying the first position on the scale of frequency, unsurpassed by dental caries [3].

Posterior cross bite is the transverse deviation malocclusion most prevalent in the primary dentition [3,4]. It is defined as the abnormal relationship of a tooth or group of teeth in the maxillary and mandibular arch or in both when in centric occlusion. Malocclusions are classified as: skeletal - due to changes in bone growth; dental - caused by an axial inclination of one or more teeth; functional or muscular - caused by a functional adaptation to tooth interference [5,6]. Early diagnosis enables a simple and low-cost intervention, allowing its implementation even in the public service [7,8].

A clear definition of diagnostic criteria facilitates the planning of preventive and assistance actions [7]. Primary dentition can be a great opportunity for intervention in cases of posterior cross bite, as during early development, it has no spontaneous correction [9].

The genetic factor is predominant in the growth and development pattern of arches, also influenced by environmental factors, oral functions, breathing pattern and nutritional quality [10,11]. With regard to occlusion of the deciduous dentition, functional factors are considered determinants for the development of malocclusions [11].

The deleterious influence of habits in the occurrence of malocclusions has been widely reported in epidemiological studies [12-14]. The horizontal and vertical relationship between dental arches can be influenced by cultural behaviors such as eating habits - natural or artificial feeding and non-nutritive oral habits - thumb sucking and pacifier use [13-18]. Some studies have observed posterior cross bite malocclusion directly associated to the presence of oral habits (23.9%) [12,13].

The aim of this study was to evaluate the prevalence of posterior cross bite in children aged 3-5 years and possible association with sociodemographic variables and deleterious habits.

## Material and Methods

This is a retrospective observational study with a longitudinal design with children aged 3-5 years enrolled in public schools in the city of Vitória, Espírito Santo, Brazil, held from July to November 2010.

A random and representative sample from a universe of 9,829 children has been selected from a sample calculation that used as parameters an expected prevalence of 35%, confidence level of 95% and error of 5%. The calculation resulted in a number of 920 children already increased of 20% to compensate for possible losses. The selection of schools was randomly made. The total examined children kept the proportionality per school, ensuring sample representativeness.

The study included children aged 3-5 years of both sexes with complete primary dentition enrolled in public schools of Vitória (ES) in the academic year 2010. Children undergoing

orthodontic intervention and carriers of syndromes with characteristics which affect the number and / or shape of teeth were excluded from the study.

Parents / guardians were invited to participate and after signing the Informed Consent Form, they answered a semi-structured questionnaire composed of six open and eighteen closed questions in order to obtain sociodemographic information and on deleterious habits - pacifier and thumb sucking.

The socioeconomic condition was categorized as A, B, C, D and E, and the ownership of goods and parental education were assessed using the Brazil economic classification criterion [19].

Clinical examination was carried out by three trained examiners (Kappa = 0.86) in schools with the child sitting in front of the examiner under natural light. The presence of posterior cross bite was considered when the upper molars occluded in lingual relationship with the lower molars in centric occlusion. When diagnosed, it was classified as unilateral - left or right and bilateral.

A descriptive analysis of data was performed through frequency tables. The comparison of percentages of cross bite and sociodemographic factors and habits was verified by the Fisher's exact test. The odds ratio calculation evaluated the magnitude of the association between variables. The significance level adopted was 5%. The SPSS statistical package - Social Package Statistical Science, version 15 - was used for this analysis.

This study was approved by the Research Ethics Committee of the Federal University of Espírito Santo (PRPPG 642/2010).

## Results

This study had a final sample of 903 preschool children. The 20% increase to compensate for possible losses was enough to represent the universe. The total number of children examined per school kept the proportionality per school, ensuring the sample representativeness.

Table 1 shows a similar sample in percentage terms between boys and girls, predominant age of three years, and 49.2% of mothers declared education above high school level. The distribution of students by school kept the proportionality of the number of enrolled students. Low frequency of subjects in classes A and E in relation to socioeconomic distribution was observed.

**Table 1. Socio-demographic data of children aged 3-5 years enrolled in public schools in the city of Vitória, 2010.**

Characteristics	N	%
<b>Sex</b>		
Female	452	50.1
Male	451	49.9
<b>Age Group</b>		
3 years	391	43.3
4 years	245	27.1
5 years	225	24.9
Not reported	42	4.7
<b>Maternal schooling</b>		

Illiterate and up to 3 <sup>rd</sup> grade of elementary school	47	5.2
From 4 <sup>th</sup> to 7 <sup>th</sup> grade of elementary school	192	21.3
Complete elementary school	179	19.8
Complete high school	367	40.0
Complete higher education	83	9.2
Not reported	35	3.9
<b>Socioeconomic condition</b>		
Class A	19	2.1
Class B	220	24.4
Class C	521	57.7
Class D	125	13.8
Class E	18	2.0
<b>Region</b>		
Santo Antonio	159	17.6
Downtown	50	5.5
São Pedro	161	17.8
Camburi/P. Canto neighborhood	100	11.1
Continent	118	13.1
Jucutuquara neighborhood	116	12.8
Maruipé neighborhood	199	22.0
<b>Total</b>	<b>903</b>	<b>100.0</b>

Data on the prevalence of cross bite and the association with independent variables are presented in Table 2.

**Table 2. Data on posterior cross bite in children aged 3-5 years of Vitória / ES, 2010.**

Characteristics	Posterior cross bite			
	Present		Absent	
	n	%	n	%
<b>Sex</b>				
Female	80	17.7	372	82.3
Male	66	14.6	385	85.4
<b>Age Group</b>				
3 years	60	15.3	331	84.7
4 years	45	18.4	200	81.6
5 years	36	16.0	189	84
Not reported	5	11.9	37	88.1
<b>Maternal schooling</b>				
Illiterate and up to 3 <sup>rd</sup> grade of elementary school	8	17	39	83
From 4 <sup>th</sup> to 7 <sup>th</sup> grade of elementary school	37	19.3	155	80.7
Complete elementary school	32	17.9	147	82.1
Complete high school	50	13.6	317	86.4
Complete higher education	11	13.3	72	86.7
Not reported	8	22.9	27	77.1
<b>Socioeconomic condition</b>				
Class A	2	10.5	17	89.5
Class B	30	13.6	190	86.4
Class C	89	17.1	432	82.9
Class D	22	17.6	103	82.4
Class E	3	16.7	15	83.3
<b>Thumb sucking</b>				
Yes	23	20.5	89	79.5
No	123	15.5	668	84.5
<b>Pacifier use</b>				
Yes	72	21.2	268	78.8
No	74	13.1	489	86.9

This study found a prevalence of posterior cross bite (MCP) of 16.2%. The case definition included unilateral and bilateral cross bite. A similar prevalence of posterior cross bite in children with habit of pacifier use and thumb sucking was observed. The frequency of pacifier use (37.65%) was three times higher than the frequency of thumb sucking (12.40%).

Table 3 presents data on the association between independent variables and the presence of posterior cross bite.

**Table 3. Association between posterior cross bite and socio-demographic factors and deleterious habits among children aged 3-5 years of Vitória / ES, 2010.**

Characteristics	Posterior Cross Bite				p-value	Odds Ratio
	Present n	%	Absent n°	%		
<b>Sex</b>						
Female	80	17.7	372	82.3	0.123	1.254
Male	66	14.6	385	85.4		0.879-1.790
<b>Age Group</b>						
3 years	60	15.3	331	84.7	0.257	1.149
4 and 5 years	81	17.2	389	82.8		0.798-1.654
<b>SEC</b>						
A/B	32	13.4	207	86.6	0.103	1.341
C/D/E	114	17.2	550	82.8		0.878-2.048
<b>Maternal schooling</b>						
Up to incomplete elementary school	45	18.8	194	81.2	0.090	1.337
Complete elementary school or higher	93	14.8	536	85.2		0.903-1.978
<b>Thumb sucking</b>						
Yes	23	20.5	89	79.5	0.116	1.403
No	123	15.5	668	84.5		0.854-2.307
<b>Pacifier use</b>						
Yes	72	21.2	268	78.8	0.001	1.775
No	74	13.1	489	86.9		1.242-2.537

Among the variables analyzed, the only one that showed statistically significant difference was pacifier use ( $p = 0.001$ ), and calculating the OR to check the strength of this association, the results showed that children who used pacifiers are 1.77 times more likely to have posterior cross bite (Table 3).

## Discussion

In the present study, it was found that the prevalence of cross bite was 16.2%, which result is similar to another Brazilian study also carried out in Vitória / ES [20], in which the prevalence of cross bite was 12%. Other Brazilian studies revealed prevalence of posterior cross bite of 11.65% in preschool children of Bauru / SP [21]; of 13.94% in children aged 3-6 years of Niterói / RJ [22] and 12.6% in children aged 4-6 years of Uberaba / MG [23]. The national oral health survey conducted in 2010 found a prevalence of 25.3% for the Southeastern region of Brazil and a prevalence of 21.9% for Brazil at the age of 5 years [3] both higher than those found in this and other studies. The different cutoff points in relation to the age of children at primary dentition mentioned in different

studies does not compromise the comparability of results since this type of malocclusion has no spontaneous correction [9]. Functional cross bite is of easy correction. Early diagnosis enables a simple and low-cost intervention, allowing its implementation even in the public service [7].

Without early treatment, it may result in facial asymmetry and temporomandibular disorders in adulthood; in addition, the hyper muscular activity on the side of the posterior cross bite can have an adverse effect on crainofacial growth [12]. The design used in this study does not allow evaluating the effectiveness of brief interventions or cause and effect relationships, which can be considered a study limitation.

This study found no statistically significant difference in relation to sex, which is in line with some authors [20,24]. However, other authors found significant association for female children [25,26]. Analyzing socioeconomic status, no significant association was found in this study, corroborating other studies carried out in Brazil [24,25]. Association between thumb sucking and posterior cross bite has been observed 26, which result was not found in this study.

This study found that the prevalence of cross bite was associated with pacifier sucking, which may suggest that this habit is a risk factor for malocclusion, corroborating results found in other studies [12,27].

Importantly, children showing pacifier sucking habit were almost twice more likely (OR = 1.775. CI 95% = 1.242; 2.537) of developing cross bite, corroborating results found in Belo Horizonte / MG [13], where this deleterious habit increased by [4] times the likelihood of developing posterior cross bite. The presence of persistent and deleterious suction habits is significantly associated with the presence of posterior cross bite [12,13].

Pacifier use beyond common and socially accepted, silencing the child's crying was the most awarded benefit, in addition to inducing sleep and comfort to the child. The knowledge of possible damages to occlusion resulting from pacifier use was not enough to discourage its use [13]. The greater inclusion of women into the labor market and subsequent decline of breastfeeding time end up by favoring the adoption of non-nutritive sucking habits [15]. The inclusion of women into the labor market even in the health area, schooling and age were not enough to avoid the use of pacifiers by children [18].

## Conclusion

The prevalence of posterior cross bite was expressive, and thumb sucking and pacifier use were considered risk factors. Association was verified with the habit of using pacifier, increasing twice the likelihood of presenting malocclusion and posterior cross bite.

## References

1. Nadanovsky P. O declínio de cárie. In: Pinto VG. Saúde bucal coletiva. 6. ed. São Paulo: Santos; 2013. Cap. 12.
2. Burt BA, Eklund SA. Odontologia prática dental e comunidade. 6. ed. São Paulo: Santos; 2007.



3. Brasil. Ministério da Saúde. Secretaria de Vigilância à Saúde. SB Brasil 2010: Pesquisa Nacional de Saúde Bucal: resultados principais; 2012.
4. Ribeiro Júnior HC, Souchois MW, Campos V, Mello HAS. Tratamento precoce da mordida cruzada funcional. *Arq Odontol* 2004; 40(2):149-58.
5. Moyers RE. Ortodontia. 4 ed. Rio de Janeiro: Guanabara Koogan, 1991.
6. Santos JA, Cavacanti AL, Sarmiento DJS, Aguiar YPC. Prevalência de mordida cruzada anterior e posterior em estudantes de 13 a 17 anos de idade da rede pública municipal de Campina Grande, PB. *RSBO* 2010; 7(3):621-7.
7. Peres KG, Traebert ESA, Marcenés A. Diferenças entre autopercepção e critérios normativos na identificação de oclusopatias. *Rev Saúde Pública* 2002; 36(2):230-6.
8. Marques LS, Barbosa CC, Ramos Jorge ML, Pordeus IA, Paiva SM. Prevalência da maloclusão e necessidade de tratamento ortodôntico em escolares de 10 a 14 anos de idade em Belo Horizonte, Minas Gerais: enfoque psicossocial. *Cad Saúde Pública* 2005; 21(4):1099-106.
9. Gois EG, Vale MP, Paiva SM, Abreu MH, Serra Negra JM, Pordeus IA. Incidence of malocclusion between primary and mixed dentitions among a Brazilian children. A 5-year longitudinal study. *Angle Orthod* 2012; 82(3):495-500.
10. Castro LA, Modesto A, Vianna R, Soviero VLM. Estudo transversal da evolução da dentição decídua: forma dos arcos, sobressaliência e sobremordida. *Pesqui Odontol Bras* 2002; 16(4):267-73.
11. Tollara MCRN, Duarte DA, Bonecher M, Pinto VG. Estudo epidemiológico da prevalência de maloclusão em crianças de 5 a 35 meses de idade. *Revista APCD* 2003; 57(4):267-73.
12. Melink S, Vagner MV, Hocevr-Boltezar I, Ovsenik M. Posterior crossbite in the deciduous dentition period, its relation with sucking habits, irregular orofacial functions, and otolaryngological findings. *Am J Orthod Dentofacial Orthop* 2010; 138(1):32-40.
13. Serra-Negra JMC, Pordeus IA, Rocha Junior JF. Estudo da associação entre aleitamento, hábitos bucais e maloclusões. *Rev Odontol USP* 1997; 11(2):79-86.
14. Tomita NE, Bijella VT, Franco LJ. Relação entre hábitos bucais e má oclusão em pré-escolares. *Rev Saúde Pública* 2000; 3(34):299-303.
15. Vasconcelos FMN, Massoni ACL, Heimer MV, Ferreira AMB, Katz CRT, Roseblatt A. Non-Nutritive sucking habits, anterior open bite and associated factors in Brazilian children aged 30-59 months. *Braz Dent J* 2011; 22(2):140-5.
16. Almeida FL, Silva AMT, Serpa EO. Relação entre má oclusão e hábitos orais em respiradores bucais. *Rev CEFAC* 2009; 11(1): 86-93.
17. Galvão ACUR, Menezes SFL, Nemr K. Correlação de hábitos deletérios entre crianças de 4 a 6 anos de escola pública e particular da cidade de Manaus, AM. *Rev CEFAC* 2006; 8(3):328-36.
18. Silvério KCA, Ferreira APS, Johanns CM, Wolf A, Furkim AM, Marques JM. Relação escolaridade, faixa etária e profissão das mães com a oferta de chupeta e mamadeira a seus filhos. *Rev CEFAC* 2012; 14(4):610-5.
19. Brasil. Critério de Classificação econômica do Brasil/2008. ABEP, ABIPEME, 2000a. [accessed 2010 abr 9]. [www.abep.org/codigosguil/Criterio\\_Brasil\\_2008r](http://www.abep.org/codigosguil/Criterio_Brasil_2008r).
20. 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.
21. Silva Filho OG, Silva PRB, Rego MVNN, Capelloza Filho L. Epidemiologia da mordida cruzada posterior na dentadura decídua. *J Bras Odontopediatr Odontol Bebê* 2003; 6(29):61-8.
22. Fernandes KP, Amaral MAT, Monico MA. Ocorrência de maloclusão e necessidade de tratamento ortodôntico na dentição decídua. *Rev Gaúcha de Odontol* 2007; 55(3):223-7.
23. Carvalho DM, Alves JB, Alves MH. Prevalência de maloclusões em escolares de baixo nível socioeconômico. *Rev Gaúcha de Odontol* 2011; 59(1):71-7.
24. Tomita NE, Bijella VT, Franco LJ. Relação entre determinantes socioeconômicos e hábitos bucais de risco para más oclusões em pré-escolares. *Pesq Odontol Bras* 2000; 14(2):169-75.
25. Silva Filho OG, Santamaria Jr M, Capelloza Filho L. Epidemiology of posterior crossbite in the primary dentition. *J Clin Ped Dent*. 2007; (32(1):73-8.
26. Macena MCB, Katz CRT, Roseblatt A. Prevalence of a posterior crossbite and sucking habits in Brazilian children aged 18-59 months. *Eur J Orthod* 2009; 31: 357-61.



27. Kobayashi HM, Scavone Junior H, Ferreira RI, Garib DG. Relação entre hábitos de sucção não nutritivos e mordidas cruzadas posteriores na dentadura decídua. *Ortodontia SPO* 2008; 41(4):367-72.