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.
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  | %   |
|--------------------------|----|-----|
| Sex                      |    |     |
| Female                   | 452| 50.1|
| Male                     | 451| 49.9|
| Age Group                |    |     |
| 3 years                  | 391| 43.3|
| 4 years                  | 245| 27.1|
| 5 years                  | 225| 24.9|
| Not reported             | 42 | 4.7 |
| Maternal schooling       |    |     |
Data on the prevalence of cross bite and the association with independent variables are presented in Table 2.

| Characteristics                              | Present | Absent |
|----------------------------------------------|---------|--------|
| **Sex**                                      |         |        |
| Female                                       | 80      | 372    |
| Male                                         | 66      | 385    |
| **Age Group**                                |         |        |
| 3 years                                      | 60      | 331    |
| 4 years                                      | 45      | 200    |
| 5 years                                      | 36      | 189    |
| Not reported                                 | 5       | 37     |
| **Maternal schooling**                       |         |        |
| Illiterate and up to 3rd grade of elementary school | 8    | 39   |
| From 4th to 7th grade of elementary school   | 37      | 155    |
| Complete elementary school                   | 32      | 147    |
| Complete high school                         | 50      | 317    |
| Complete higher education                    | 11      | 72     |
| Not reported                                 | 8       | 27     |
| **Socioeconomic condition**                  |         |        |
| Class A                                      | 2       | 17     |
| Class B                                      | 30      | 190    |
| Class C                                      | 89      | 432    |
| Class D                                      | 22      | 103    |
| Class E                                      | 3       | 15     |
| **Thumb sucking**                            |         |        |
| Yes                                          | 23      | 89     |
| No                                           | 123     | 668    |
| **Pacifier use**                             |         |        |
| Yes                                          | 72      | 268    |
| No                                           | 74      | 489    |

Table 2. Data on posterior cross bite in children aged 3-5 years of Vitória / ES, 2010.
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                 | Present | Absent | p-value | Odds Ratio |
|---------------------------------|---------|--------|---------|------------|
|                                 | n       | %      | n*      |            |
| **Sex**                         |         |        |         |            |
| Female                          | 80      | 17.7   | 372     | 82.3       | 0.123 | 1.254 |
| Male                            | 66      | 14.6   | 385     | 85.4       | 0.879-1.790 |
| **Age Group**                   |         |        |         |            |
| 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 |
| **SEC**                         |         |        |         |            |
| 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 |
| **Maternal schooling**          |         |        |         |            |
| 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 |
| **Thumb sucking**               |         |        |         |            |
| Yes                             | 23      | 20.5   | 89      | 79.5       | 0.116 | 1.403 |
| No                              | 123     | 15.5   | 668     | 84.5       | 0.854-2.307 |
| **Pacifier use**                |         |        |         |            |
| 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 craniofacial 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.

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