Dental Malocclusion and Non-Nutritive Habits: An Epidemiological and Comparative Study

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Abstract: *Objective:* To study the relationship between dental malocclusions and non-nutritive, and deleterious habits in children from the public school system in a city in the interior of Paraíba, Brazil.

Methods: This was a prospective, quantitative and analytical cross-sectional study carried out with 122 children, aged 7 to 11 years, and their caregivers; of both sexes, through the application of a validated questionnaire with the following variables: type of breastfeeding; nutritional, non-nutritive and chewing habits, in addition to intra and extra-oral examination to detect malocclusions and relate them to habits. The data obtained were analyzed by descriptive statistics using the IBM SPSS Statistics Software.

Results: The sample, with a mean age of 8.38 years, presented a majority of male (53.3%) and brown participants (56.6%). Of the total, most children were fed mixed, using a cup; did not have allergic rhinitis, adenopathies, snoring or nocturnal drooling; 64.8% did not have non-nutritive habits; and among the chewing habits, onychophagia was the most common (53.3%).

Conclusion: There was a significant correlation between non-nutritive habits and the occurrence of malocclusions.

Keywords: Occlusion, Malocclusion, Epidemiology.

INTRODUCTION

The stomatognathic system is composed of muscles, bones, teeth, joints, glands, mucous membranes, vessels and nerves. These perform functions in common, having as a basic characteristic the participation of the mandible in the food crushing action; which allows swallowing and the digestive process to take place [1].

Occlusion, an integral part of the masticatory system, is the area of dentistry that deals with the relationships of dental contacts between the upper and lower arches, and its implications on the adjacent structures: teeth, gums, bones, muscles, ligaments and temporomandibular joint. Occlusion may vary between individuals according to the size and shape of the teeth, tooth position, time and sequence of eruption; dental arch shape and size and craniofacial growth pattern; in addition to environmental influences, functional and pathological changes [2-4].

Malocclusion is conceptualized as any deviation from normal dental occlusion, which can affect the four systems simultaneously: teeth, bones, muscles and ligaments, and temporomandibular joint; as well as the masticatory process, chewing and the entire process of swallowing. The factors that cause malocclusions are varied and of diverse origins, from genetic and congenital alterations, to factors linked to the environment and harmful habits, affecting the development of teeth, bones and the entire orofacial neuromuscular system [5, 6].

Among the habits that can cause malocclusion, digital and pacifier sucking, inappropriate choice and use of the bottle nipple, mouth breathing and tongue thrusting stand out. These habits are considered deleterious when they have high intensity and frequency, causing changes in the growth and development of the face and dental archés [7].

Malocclusions rank third on the scale of priorities and oral health problems. The prevalence of at least one malocclusion problem in seven-year-old children is 66.7%, according to the National Oral Health Survey (2010), thus emphasizing the need for prevention and control of these anomalies, through preventive and/or specialized treatments in public care networks [8, 9].

This fact was also reported by the World Health Organization (WHO) in 1991 [10], which highlighted, among the main oral diseases, dental malocclusions; suggesting that periodic epidemiological surveys be carried out, as knowledge of the epidemiological situation of the population it is essential, both for the planning of primary care programs and for the execution of prevention and treatment services.

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In Brazil, children have one of the highest rates of premature tooth extractions due to extensive caries lesions and, consequently, there is a loss of required space, which may cause occlusal problems [11].

Furthermore, studies such as that by Krammer PF, *et al*. (2013), state that occlusal problems exert a great influence on quality of life, constituting an important indicator of health and well-being of the population [12-14].

In view of the above, the present work studied the relationship between dental malocclusions and non-nutritive, and deleterious habits in children aged between 7 and 11 years old, enrolled in public schools in the interior of Paraíba. In addition, it was intended to guide patients and guardians regarding the correct way to chew food; guidance on oral hygiene; as well as referring patients to the correct orthodontic treatment, in cases where necessary.

METHODS

It was a cross-sectional, prospective, quantitative and analytical study, which was carried out from direct observation, through clinical examination in schoolchildren aged 7 to 11 years; and completion of the form by those responsible.

The research was carried out in the municipality of Bom Sucesso, PB, at the Municipal School Balbina de Almeida Oliveira. Total 250 children, of both sexes, were found to be enrolled at the Municipal School Balbina de Almeida Oliveira, in the city of Bom-Sucesso, PB, Brazil. The sample for our study consisted of children who were within the age group between 7 and 11 years old, totaling 122 children, with their respective guardians, who freely agreed to participate in the research by signing the Term of Free and Informed Consent.

Children whose parents or guardians refused to participate or did not allow the intra-oral clinical examination to be carried out were excluded; or even those who used orthodontic appliances for preventive or interceptive purposes; parents who refused to answer a question or removed the child; or incompletely answered the questionnaire, in addition to special children unaccompanied by a guardian.

Data collection was performed by a single examiner, guided and duly trained by the researcher in charge. For this, an intra-examiner calibration was carried out, to assess how much the examiner agrees with himself, through the Kappa Test, thus guaranteeing greater consistency between the exams. An adapted questionnaire was applied [15] (Figure **1**), by the examiner,. In addition, a clinical examination was performed to supplement the clinical information that addressed the variables studied in the research.

Data collection was carried out in two stages: (1) Delivery of the form to parents or guardians; (2) clinical examination of the child's oral cavity. The researcher provided necessary explanations about the completion of the first part of the questionnaire by the children's parents or guardians, as well as their consent to participate in the research; and the intra and extra oral clinical exams that would be performed on the children. The examiner collected the children's clinical, intra and extraoral data, and recorded them on the data collection form.

The assistant was responsible for organizing the environment, taking the child from the classroom to the examination site, taking notes on the intra- and extra-oral clinical examination information in the questionnaire, and returning the child to the classroom.

The beneficence of this research is linked to the fact that all children will have their parents informed about the occlusal deviations found, as well as those that prove to be interested parties will be promptly forwarded to the Orthodontics service at UNIFIP/PB, to carry out the necessary orthodontic treatment.

The risks of the research were related to the possibility of discomfort for the child, when keeping his mouth open during the intra-oral examination and the possibility of some embarrassment of the parents or guardians while answering the questionnaire. However, these were eliminated by the examiner, since the oral examination was performed in a non-invasive way and with great agility, avoiding the discomfort of opening the mouth. In addition, the embarrassment was eliminated through a prior conversation with the person in charge, in order to make him feel comfortable and safe in relation to the questions that will be asked.

Prior to data collection, the researcher provided the necessary clarifications to the parents/guardians, through a Term of Free and Informed Consent, with information about the purpose and importance of the study, resulting in voluntary participation while maintaining the confidentiality of their identities.

The study followed the precepts of Bioethics (Resolution 466/12), and was approved by the Ethics Committee for Research with Human Beings of UNIFIP/PB (OPINION: 2,002,866). A letter was sent to

DATA COLLECTION FORM

1 Age

( ) 7 Years ( ) 8 Years ( ) 9 Years ( ) 10 Years ( ) 11 Years

2 Skin Color

( ) Black ( ) White ( ) Brown

3 Type of breastfeeding

( ) Natural ( ) Artificial ( ) Mixed

4 Utensil for ingesting liquids

( ) cup ( ) straw ( ) bottle

5 Allergic rhinitis, adenopathy, snoring or drooling at night

( ) Yes No

6 Non-Nutritive Habits

( ) pacifier sucking ( ) finger sucking ( ) tongue thrusting

7 Chewing Habits

( ) Onychophagia ( ) Bruxism

8 Facial type

( ) Long face ( ) Short face ( ) Balanced face

9 Classification Angle

( ) Class I ( ) Class II ( ) Class III

10 Malocclusion

( ) Open bite   ( ) Posterior crossbite   ( ) Anterior crossbite   ( ) Overjet

( ) Overbite   ( ) Dental crowding   ( ) Bite on top

Figure 1: Data collection form. Source: Melo, TRNB *et al*, 2022.

the Municipal Secretary of Education of Bom Sucesso, PB, Brazil, to clarify the objectives of the research and with that, institutional authorization was obtained for the development of the study.

For data analysis, descriptive statistical analysis was performed in order to characterize the sample. Then, the absolute frequencies and percentages of categorical variables were calculated, as well as measures of central tendency and variability of quantitative variables. Later on, to determine the association between the studied variables, Pearson's chi-square test or Fisher's exact test were used when appropriate [16].

The significance level was set at 5% ($p < 0.05$). All analyzes were conducted using IBM SPSS software (Statistical Package for Social Sciences) version 20.0 and considering a 95% confidence interval.

The heading of Results must be included here.

Table 1:   Distribution of Variables According to Sample Characterization and Nutritional Habits

Variables	Number	Percentage
Age (years)		
Average: 8,38		
Standard deviation: 1,17		
Minimum value: 7,00		
Maximum value: 11,00 **Sex** Feminine Masculine	 57 65	 46,7 53,3
Skin color [122]		
Black	6	4,9
White	47	38,5
Brown	69	56,6

Type of breastfeeding [122]		
Natural	47	38,5
Artificial	23	18,9
Mixed	52	42,6
Utensil used to ingest liquids [122]		
Glass	89	73,0
Straw	3	2,5
Baby bottle	30	24,6
Allergic rhinitis, adenopathy, snoring or night drooling [122]		
Yes	32	26,4
No	90	73,6
Non-nutritive habits [122]		
No	79	64,8
Pacifier suction	16	13,1
Finger sucking	16	13,1
Lingual interposition	11	9,0
Chewing habits [122]		
No	44	36,1
Onychophagy	65	53,3
Bruxism	13	10,7

Note. Values between [ ] indicate the total number of valid cases for each variable.
Source: Melo TRNB, *et al*., 2022.

Table 2: Distribution of Facial Type, Angle Classification and Malocclusions.

Variables	Number	Percentage
Facial Type [122]		
Long face	29	23,8
Short face	28	23,0
Balanced face	65	53,3
Angle Classification [122]		
Class I	99	81,1
Class II	20	16,4
Class III	03	2,5
Malocclusion [90 – 73.7% had malocclusion out of a total of 122]		
Open bite	24	26,7
Posterior crossbite	6	6,7
Anterior open bite	3	3,3
Increased/decreased overjet	1	1,1
Increased/decreased overbite	6	6,7
Dental crowding	47	52,2
Bite on top	3	3,3

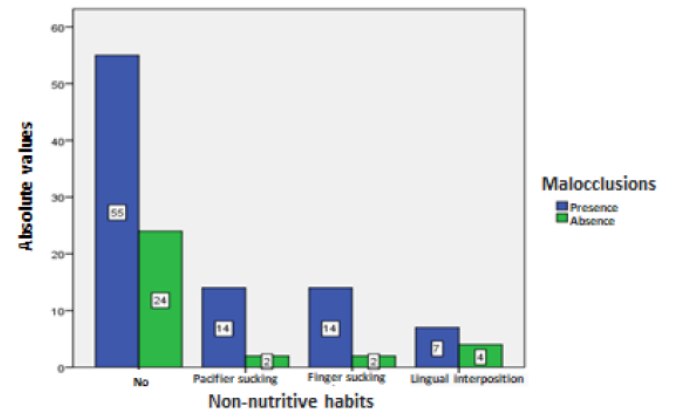Note. Values between [ ] indicate the total number of valid cases for each variable.
Source: Melo TRNB, *et al*., 2022.

Graphs **1** to **5** show the results of the bivariate analysis and correlation between variables.
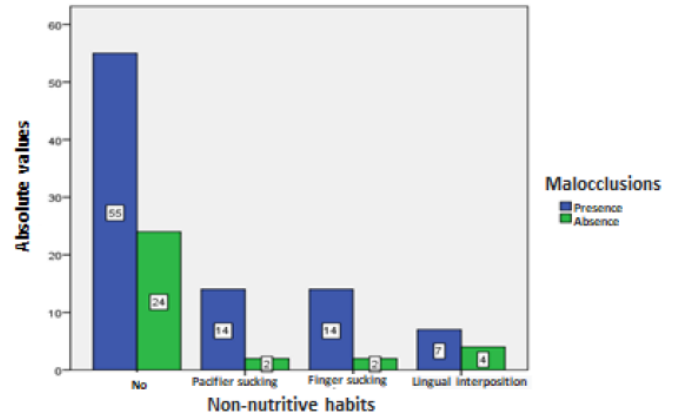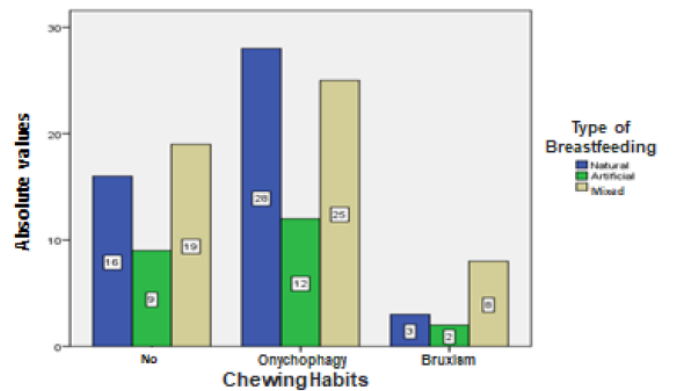

Source: Melo TRNB, *et al*., 2022.

Graph 1: Association between non-nutritive habits and malocclusion. Not significant (Fisher's exact test: $p > 0.05$).
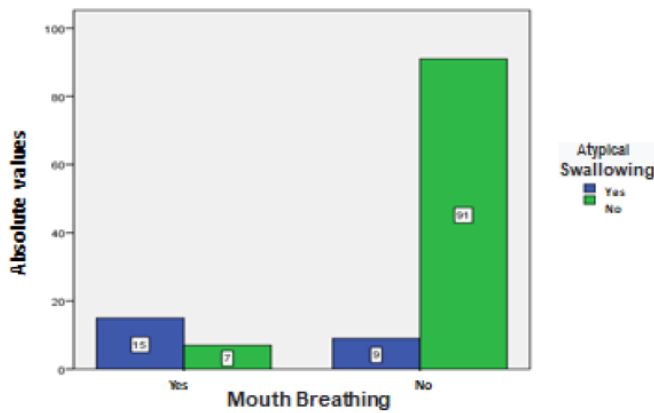

Source: Melo TRNB, *et al*., 2022.

Graph 2: Association between breastfeeding and non-nutritive habits. Not significant (Fisher's exact test: $p > 0.05$).
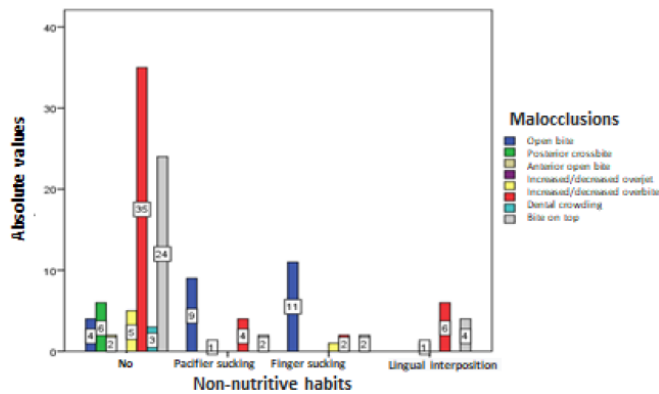

Source: Melo TRNB, *et al*., 2022.

Graph 3: Association between breastfeeding and chewing habits. Not significant (Fisher's exact test: $p > 0.05$).

Source: Melo TRNB, *et al*., 2022.

Graph 4: Association between mouth breathing and atypical swallowing. Not significant (Fisher's exact test: p > 0.05).

Source: Melo TRNB, *et al*., 2022.

Graph 5: Association between non-nutritive habits and types of malocclusion. Significant (Fisher's exact test: p < 0.001).

DISCUSSION

Malocclusion has an early appearance and an assessment, in public health, of the characteristics of occlusion in the mixed dentition is extremely important, detecting normal patterns and disorders in this age group, since occlusal alterations can be perpetuated in the permanent dentition if no corrective action is taken [17]. Knowing the prevalence of deleterious habits and malocclusions are factors that contribute to the diagnosis and treatment planning and especially to the prevention of occlusal problems.

Epidemiological studies in the literature indicate that most children in the mixed dentition phase present some type of morphological occlusion deviation, defined as malocclusions. High rates are expected for this age group, since intense occlusal changes and dental changes occur in this phase and the occlusion is highly susceptible to external agents, such as deleterious habits [18].

Within this context, the study showed high rates of malocclusion in relation to normal occlusion in the studied population, where 73.8% of children had some type of malocclusion and 26.2% demonstrated normal occlusion, thus evidencing the severity of this problem in the field of Public Health. Although high, the results were similar to those found in previous Brazilian studies [2, 19].

Angle's classification, seen as a diagnostic key for malocclusions, showed a high incidence of Class I in the sample, present in 81.1% of the children, followed by Class II (16.4%) and Class III (2. 5%). These results corroborate those found in the research by Arashiro [2] and Boeck [20], where Class I also had a higher prevalence.

Caries and premature loss of deciduous molars result in a decrease of approximately 2 to 4 mm per quadrant in arch length. In the present research, the early loss of deciduous molars showed a low frequency in the sample (5.7%), as well as the presence of facial asymmetry (0.8%) coming close to the values of the research by Boeck [20] and Almeida [7] in which the premature loss of molars corresponded to only (5.19%) and (4.65) respectively.

The study observed a relationship between racial miscegenation and malocclusions, as it was found that most children with malocclusions were brown. This data corroborates the study by Prabhakar [13], because, according to these authors, racial miscegenation is a determining factor for the development of malocclusions.

As for the evaluation of the facial type, the vast majority had a mesofacial face corresponding to 53.3% of the sample. According to Boeck [20] individuals who have not yet entered the adolescence stage usually have a mesofacial face, or very close to it, in addition to a straight or slightly convex profile, which is very appropriate for their age. Patterns such as long or short face tend to become more evident during the pubertal growth spurt.

The most frequent oral habit was onychophagia, corresponding to 53.3% of the children who presented chewing habits, followed by finger and pacifier sucking, which presented the same values in 13.1% of the sample. The low value found in relation to pacifier and finger sucking is possibly due to the fact that children feel embarrassed when declaring that they have this habit. As in the case of onychophagia, children end up involuntarily   exposing   the   habit   in   the   social

environment in which they live. This sentence doesn't make sense, please check.

The prevalence of pacifier sucking was the same as that of digital sucking, which is in disagreement with the literature, as observed in studies by Johanns [21], where a percentage of 22.2% of children with a pacifier habit and 3.3% digital sucking was reported; and Martins [22], with 43.3% of children using a pacifier and 12.8% digital sucking.

In the present research, it was observed that most of the children who used a pacifier, finger or tongue thrusting presented malocclusion, in line with the data found in the study by Matsuo [23] and Carvalho [19], which showed oral habits.

According to Brito [24] and Gleiser [25] primary crowding type of malocclusion has the highest prevalence among the others with values greater than 35%. In the present study also, dental crowding was observed with the highest prevalence rate of 52.2% , similar to the work of Sousa JP; Sousa [17], in which 67.3% of participants had crowding.

Anterior open bite was present in 30.0% of the sample. Romano [26] had stated that the increase in the percentage of anterior open bite in children with the mixed dentition can be explained by the increased incidence of deleterious oral habits in this age group.

The relationship between pacifier and finger sucking in relation to anterior open bite can also be observed. On the other hand, among children who had the habit of tongue thrusting, the occurrence of dental crowding was more commonly observed. It is important to emphasize that from an orthodontic point of view, they deserve attention, mainly because children persist with such harmful habits for a longer time, thus contributing to the appearance of malocclusions found in the research [27].

The study observed a relationship between mouth breathing and atypical swallowing, where most of the children who had atypical swallowing were mouth breathers, agreeing with author's name should be mentioned here [5].

Leôncio [28] highlighted that, within the area of attention of public services, the treatment of malocclusion is extremely important, due to the physiological changes that affect the oral cavity. Thus, early treatment, before the age of six, would be ideal, due to the ease of growth and the effectiveness in the

process of tissue remodeling, being able to act in the prevention and correction of these alterations, returning normal form and functionality to the system.

CONCLUSION

According to the data collected by this study, it could be concluded that non-nutritive habits (pacifier sucking, finger sucking and tongue thrusting) had a significant relationship with the occurrence of malocclusions.

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