Breastfeeding, deleterious oral habits and malocclusion in 5-year-old children in São Pedro, SP, Brazil

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Abstract

Objective: To estimate the frequency of malocclusion and their associations with the type and period of breastfeeding, deleterious oral habits, and information received by mothers during the pre-natal period, in 5-year-old children attending municipal daycare centers. **Methods:** The sample consisted of 162 children resident in the municipality of São Pedro, SP, Brazil. In an interview with each of the mothers, information was collected about the time and form of breastfeeding, presence of deleterious habits, and information the mother received during the pre-natal period. The epidemiological exam was performed at the daycare center facilities by a single, previously calibrated examiner, under direct lighting. The following variables were evaluated: presence and severity of malocclusion [slight overcrowding and spacing (OS)], open occlusal relationship (open bite) (OPB), vertical overlap (over bite) (OVB), uni- or bilateral crossbite (CB), positive overjet (OV) and the primary second molar terminal plane relationship (TPR)]. Data analysis consisted of univariate analysis (chi-square test) and multiple logistic regressions. **Results:** The prevalence of malocclusions was 95.7% (OS = 22.8%; OPB = 24.7%; OVB = 20.4%; CB = 14.8%; and OV = 13.0%). In TPR the straight terminal plane was predominant (85.0%). Among the deleterious oral habits, the use of a pacifier was the only risk indicator (OR = 5.25; p = 0.001) for open occlusal relationship (open bite) in children that used it for over three years, detected in the logistic regressions. **Conclusion:** The prevalence of malocclusions and deleterious oral habits in the studied sample was high. Children that used a pacifier for over three years showed greater probability of presenting with open occlusal relationship (open bite).

Keywords: Breastfeeding. Malocclusion. Children.

INTRODUCTION

Breastfeeding is far more than mere nutrition; it is a decisive and primordial factor in the correct maturation and growth of the stomatognathic system structures, maintaining them apt for exercising the development of the orofacial musculature, which in turn will guide and stimulate the development of physiological functions, guaranteeing survival and quality of life.[4] The stomatognathic system performs many functions, comprising suction, swallowing, chewing, speech/articulation, which involve the neuromuscular activities of the face, affecting and producing continual changes in the forces that act on bones and teeth.[21] Therefore, breastfeeding is the best orthopedic appliance one can offer an adult's face in terms of harmonious development.[25]

The World Health Organization (WHO) recommends that the nutritional and immunological conditions of mother's milk cannot be replaced by any other natural or synthesized product, however, it has still not recognized the severe lesions that are produced in the stomatognathic system by the lack of functional stimuli coming from nursing at the mother's breast, which is imperative for the good development of the system in the most important period of the new being's life.

In fact, natural breastfeeding is performed through enormous muscular effort. The newborn is forced to bite, advance and retract the mandible, which makes the entire muscular system, particularly the masseter, temporal and pterygoid muscles develop and acquire the muscular tonus required for use when the time for chewing arrives. On the other hand, the early introduction of the feeding bottle, although it satisfies the baby's nutritional needs, annuls an enormous quantity of excitation that begins in the mouth, particularly of the temporomandibular joints, and does not provide the development responses necessary for facial growth and development.

Thus, deviations in the development of the stomatognathic system may become established right from the time of babyhood. Many malocclusions result from the combination of small deviations from normality, which are still far too slight to be classified as abnormal, but their combination and persistence help to produce a clinical problem that must be solved. Frequently they originate from noxious orofacial muscular habits, attributed to alternated functions such as prolong non-nutritional sucking, inadequate dietary habits, pasty diet, nasopharyngeal diseases, respiratory function disturbances, abnormal tongue posture and caries disease. In this context, the majority of malocclusions can be prevented.[17]

Therefore, the study of malocclusions and their relationship with deleterious oral habits and functional imbalance of primary occlusion is of extreme relevance, both in the Public Sector and in private clinics, in order to obtain parameters of action for functional orthopedic programs targeting the community, which in general presents a low frequency of natural breastfeeding, with high prevalence of early weaning.

In this context, the aim of this study was to estimate the frequency of malocclusions and their associations to the type and period of breastfeeding, deleterious oral habits and information with reference to the pre-natal period, in 5-year-old children who frequented the municipal daycare centers in the municipality of São Pedro, SP, Brazil.

MATERIAL AND METHODS
Ethical aspects

This study was approved by the Research Ethics Committee of the Piracicaba School of Dentistry, University of Campinas, in accordance with National Health Council resolution 196/96 of 10/10/1996 of the Ministry of Health, Process Number 108/2004.

Study location

This research was developed in the municipality of São Pedro that has an estimated population of 23,352 inhabitants in a territorial area of 618 km², with 80% of people residing in the urban area. The economic profile of the city is characterized by the mean nominal income of R$ 644.55 for persons aged 10 years or older, and with 1,437 persons without schooling or less than one year of schooling. In the municipality, there are 11 health establishments, with seven providing service to the National Health Service (SUS), 80 hospital beds of which 38 provide services to SUS.[8] Around 22.63% of the pregnant mothers in the municipality received over six consultations in the prenatal period. The population from zero to six years of age consists of 2,912 children, 100% have received the complete vaccination schedule and 6.67% are enrolled in daycare centers. Around 50.65% of the fathers and 20.43% of the mothers of these children have a precarious educational level (less than four years of schooling). In the Brazilian Childhood Status map (2001), the municipality of São Pedro was ranked 960th in the Federal and 318th in the State classification, with a Childhood Development Index of 0.609 still considered unsatisfactory.[28]

Study design

This cross-sectional study was developed in three stages. The first stage was based on collecting retrospective information about the period and type of breastfeeding and sucking habits, by means of interviews with the parents. The second stage was composed of a cross-sectional epidemiologic survey about malocclusion.

Study universe

The target population was all the 5-year-old children regularly enrolled in the Municipal Daycare Centers of the city of São Pedro-SP in 2005, totaling 186 children. The sample was distributed among three Municipal Infant Educational Centers (CEMEIs) (CEMEI Dra. Halina Buba Baldon, CEMEI Maria Amélia Pimentel e CEMEI Maria Angelina Leão Ferreira dos Santos). The Municipal Secretary of Education uses socioeconomic criteria for children entering the Municipal Daycare Centers, which made the sample homogeneous from this aspect. The studied population represented individuals from categories SES C, D and E of the population. The children excluded from the study were those whose parents or legal representatives did not return the signed Term of Free and Informed Consent (TFIC) and/or completed questionnaire. Thus the final sample consisted of 162 children.

First stage interview with parents

During pre-scheduled meetings, the mothers received and signed the TFIC, authorizing the child's participation in the research. After this, a personal interview was held with each mother, following a pre-tested questionnaire to collect information about the time and form of breastfeeding and the presence of deleterious habits.

Second stage: Epidemiological survey of malocclusion

The survey was conducted at the Daycare Center facilities, by a single, calibrated examiner, using a school chair, under direct lighting, in accordance with the biosafety rules in force in the country, at intervals of approximately five minutes for each exam.

Examiner calibration consisted of previous training, in order to reduce the disagreements of interpretation relative to the researched conditions at the time of applying the criteria proposed by the World Health Organization.[29] To evaluate the effectiveness of calibration, 18 children previously selected at one of the Daycare Centers were evaluated by the examiner with regard to all the survey items. The Kappa values for intra-examiner agreement ranged from 0.85 to 0.91, agreement being considered excellent.[11]

Codes and criteria used in the exam
Classification of malocclusion

For the age of 5 years, the same index was adopted as that recommended by the SB Brazil Project – Survey on Brazilian Population Oral Health Conditions.[3] The codes and criteria used were those recommended by the WHO, 1987 version, since it presents the conditions relative to each category of malocclusion defined with greater precision, offering more elements for considering the problem. Thus, the following criteria were adopted for classifying the occlusal condition at 5 years of age:

- Normal: absence of occlusal alterations.
- Slight: When there are one or more teeth with disturbance of position (rotation); or slight crowding; or spacing harming regular alignment.
- Moderate/Severe: When there was an unacceptable effect on facial appearance; or a significant reduction in masticatory function; or phonetic problems observed due to the presence of one or more of the following conditions in the four anterior incisors: 1) maxillary horizontal overlap estimated at 9 mm or more, positive overjet; 2) mandibular horizontal overlap, anterior reverse articulation (crossbite) equal to or greater than the size of one tooth, negative overjet; 3) open occlusal relationship (open bite); 4) midline deviation estimated at 4 mm or more and; 5) crowding or spacing of 4 mm or more.

It is worth pointing out that the occlusal alterations that were not explicit in the above criteria, such as posterior reverse articulation (uni or bilateral posterior crossbite), overbite or vertical overlap of over 2 mm were included in the slight category.

Molar relationship

The distal relationship of the maxillary and mandibular primary second molars was classified according to Baume:[2]

- Straight: Forming a plane.
- Distal step: Forming a distal step to the mandible.
- Mesial step: Forming a mesial step to the mandible.

Statistical analysis

To verify the association of the most frequent malocclusions in the sample with the forms of breastfeeding, deleterious oral habits, and information received by the mothers during the prenatal period, the chi-square test for contingency tables (univariate analysis) was used. Variables that presented $p \leq 0.15$ in the test of association were selected to enter in the multiple logistic regression analysis. The Odds Ratio (OR) and respective confidence intervals of 95% were estimated for the indicators that remained in the multiple regression model at the level of 5%. All the analyses were performed using the statistical program SAS.[22]

RESULTS

The response rate for the study was 87%, since the children that had no authorization, or whose parents did not appear at meetings to answer the questionnaire were excluded.

The results collected in the questionnaire showed that the majority (55.5%) of the children were breastfed up to the age of six months, and that 11.1% (n = 18) of the children were never breastfed. Regarding exclusive breastfeeding (EBF), only 12.3% did not receive exclusive breastfeeding. About 68% of the mothers did not have access to information about natural breastfeeding, exclusive breastfeeding, use of feeding bottle, pacifier and finger sucking, during the prenatal period. The predominant educational level of the mothers (61.1%) was from 1 to 4 years of formal schooling. As regards the deleterious oral habits, 93.2% of the children made use of a feeding bottle (Table 1).

In the epidemiological exam it was verified that 4.3% (n = 7) of the children presented normal occlusion, 58.6% (n = 95) slight and 37.1% (n = 60) moderate/severe malocclusion. Figure 1 displays graphs that show the distribution of malocclusions and the molar relationship in the studied sample. It was verified that over half the
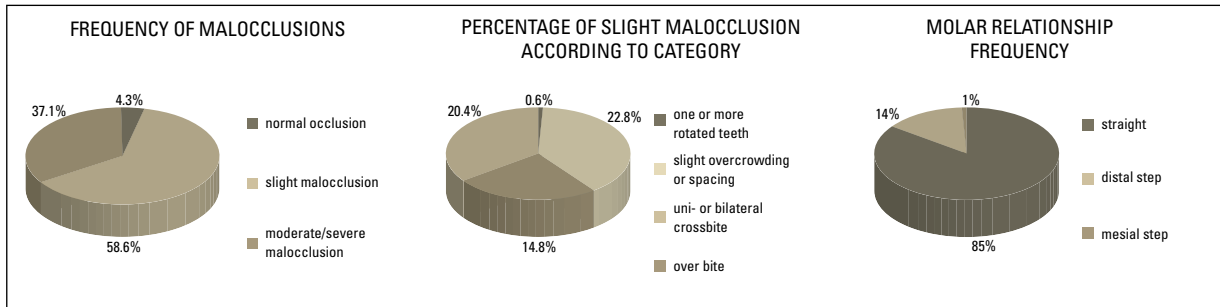
FIGURE 1 - Graphical illustration showing distribution of malocclusions and of molar relationship.

TABLE 1 - Sample distribution according to the variables collected in the interview (n = 162).

VARIABLE	CATEGORY	N	%
Time of breastfeeding	Not breastfed	18	11.1
	Up to 6 months	90	55.5
	Longer than 6 months	54	33.3
Time of exclusive breast-feeding (EBF)	Not breastfed	20	12.3
	Up to 3 months	69	42.6
	Longer than 3 months	73	45.1
Mothers who received information in the prenatal period	Yes	52	32.1
	No	110	67.9
Mothers educational level	1st to 4th grade	99	61.1
	5th to 8th grade (high school)	38	23.5
	Middle School	2	1.2
	Higher education	2	1.2
Deleterious oral habits	Use of feeding bottle	151	93.2
	Use of pacifier	103	63.5
	Finger sucking	14	8.6

children (58.6%) presented slight malocclusion. Within each category (light malocclusion and moderate/severe malocclusion) the pertinent classifications were also evaluated, with the aim of evaluating the problem more precisely. With

regard to the slight malocclusion, slight crowding or spacing harming the regular alignment was found in 22,8%, uni- or bilateral posterior reverse articulation (crossbite) in 14.8% and vertical overlap (overbite) of more than 2 mm in 20.4% (n = 32). Among the moderate/severe malocclusion, positive overjet was observed in 13.0% (n = 21) and open occlusal relationship (open bite) in 24.7% (n = 36) of the sample. In the majority of the children, the molar relationship was the straight terminal plane (85.0%).

In the univariate analysis, using the presence of deleterious oral habits as a dependent variable, it was verified that the time of exclusive breastfeeding presented statistically significant association (p= 0.0035), in contrast with the time of breastfeeding and the information received in the prenatal period, which were not associated with the dependent variable (Table 2). Nevertheless, in the multivariate analysis no statistical significance was verified between deleterious oral habits and time of exclusive breastfeeding (the only variable that entered the model).

Tables 3, 4 and 5 show the results of the univariate analysis between the independent and dependent variables (malocclusion).

In Table 3, the variable "time of pacifier use" (p= 0.0302) was associated to "Slight Presence of Crowding or Spacing" whereas the variable "time of breastfeeding" (p = 0.0476) was associated to the "Presence of Positive Overjet", both at

TABLE 2 - Univariate Analysis (Chi-square test) between independent variables and deleterious oral habits.

Independent Variables		Deleterious oral habits		p-Value
		Presence	Absence	
		n/N (%)	n/N (%)	
Time of breastfeeding	0 to 6 months	108/108 (100.0%)	0/108 (0.0%)	1.000
	Longer than 6 months	47/54 (87.04%)	7/54 (12.96%)	
Time of EBF	0 to 3 months	88/88 (100.0%)	0/88 (0.0%)	0.0035
	Longer than 3 months	67/74 (90.54%)	7/74 (9.46%)	
Information in prenatal period about breastfeeding and habits	Yes	50/52 (96.15%)	2/52 (3.85%)	1.0000
	No	105/110 (95.45%)	5/110 (4.55%)	

TABLE 3 - Univariate Analysis (Chi-square test) between independent variables and dependent variables: Presence of slight crowding or spacing; Presence of positive overjet.

Independent Variables		Dependent Variables			
		Presence of slight crowding or spacing		Presence of positive overjet	
		n/N (%)	p-Value	n/N(%)	p-Value
Time of breastfeeding	0 to 6 months	25/108 (23.15%)	0.8819	16/108 (14.81%)	0.0476
	Longer than 6 months	13/53 (24.53%)		5/53 (9.43%)	
Time of EBF	0 to 3 months	24/88 (27.27%)	0.4188	10/88 (11.36%)	0.6135
	Longer than 3 months	14/72 (19.44%)		11/74 (14.8%)	
Time of f feeding bottle use	0 to 3 years	22/75 (29.33%)	0.1365	6/75 (8.00%)	0.1019
	Longer than 3 years	16/87 (18.39%)		15/87 (17.24%)	
Time of pacifier use	0 to 3 years	31/107 (28.97%)	0.0302	14/107 (13.08%)	1.000
	Longer than 3 years	7/55 (12.73%)		7/55 (12.73%)	
Finger sucking	Sucked fingers	5/14 (35.71%)	0.3203	4/14 (28.57%)	0.0878
	Did not suck fingers	33/148 (22.30%)		17/148 (11.49%)	

a level of significance of 5%. The results of Table 4 showed evidence that no malocclusion was associated to the presence of posterior reverse occlusal relationship (posterior crossbite); nevertheless the variables time of breastfeeding (p = 0.0152) and time of exclusive breastfeeding (p = 0.0233) were associated to the presence of vertical overlap (overbite). Multiple logistic regression analyses were performed for each dependent variable

described above, including the independent variables that obtained a level of significance of up to 15%. Nevertheless, no independent variable remained in the logistic regression model.

Table 5 shows the univariate analysis and multiple logistic regression analysis for the malocclusion "presence of open occlusal relationship (open bite). The time of feeding bottle use (p = 0.0898) and time of pacifier use (p = 0.001) were

TABLE 4 - Univariate Analysis (Chi-square test) between independent variables and dependent variables: Presence of posterior crossbite; Presence of overbite.

Independent Variables		Dependent Variables			
		Presence of posterior crossbite		Presence of overbite	
		n/N (%)	p-Value	n/N (%)	p-Value
Time of breastfeeding	0 to 6 months	18/108 (16.67%)	0.5589	15/108 13.89%)	0.0152
	Longer than 6 months	6/53 (11.32%)		17/54 (33.08%)	
Time of EBF	0 to 3 months	14/88 (15.91%)	0.2735	11/88 (12.50%)	0.0233
	Longer than 3 months	9/72 (87.50%)		21/74 (28.37%)	
Time of feeding bottle use	0 to 3 years	9/75 (12%)	0.3831	17/75 (22.67%)	0.4321
	Longer than 3 years	15/87 (17.24%)		15/87 (17.24%)	
Time of pacifier use	0 to 3 years	15/107 (14.02%)	0.8157	24/107 (22.43%)	0.2988
	Longer than 3 years	9/55 (16.36%)		8/55 (14.55%)	
Finger sucking	Sucked fingers	0/14 (0.00%)	0.2278	3/14 (21.43%)	1.000
	Did not suck fingers	24/148 (16.22%)		29/148 (19.59)	

TABLE 5 - Univariate Analysis (Chi-square test) and multiple logistic regression analysis between the presence of open bite and independent variables.

Independent Variables		UNIVARIATE ANALYSIS		MULTIPLE LOGISTIC REGRESSION ANALYSIS	
		Presence of open bite		Presence of open bite	
		n/N (%)	p-Value	OR (IC95%)*	p-Value
Time of breastfeeding	0 to 6 months	27/108 (25.00%)	0.4679		
	Longer than 6 months	9/53 (16.98%)			
Time of EBF	0 to 3 months	23/88 (26.14%)	0.4005		
	Longer than 3 months	13/72 (18.06%)			
Time of feeding bottle use	0 to 3 years	12/75 (16.00%)	0.0898		
	Longer than 3 years	24/87 (27.59%)			
Time of pacifier use	0 to 3 years	13/107 (12.15%)	0.001	1.00	0.001
	Longer than 3 years	23/55 (41.82%)		5.25 (2.208-11.494)	
Finger sucking	Sucked fingers	2/14 (14.29%)	0.7371		
	Did not suck fingers	34/148 (22.97%)			

* OR: Odds Ratio; IC: Interval of confidence 95%.

associated to the presence of open occlusal relationship (open bite). In the regression analysis only the variable time of pacifier use remained in the model. The children that used a pacifier for longer than 3 years had 5.25 greater probability of presenting open occlusal relationship (open bite) than the others (p = 0.001).

DISCUSSION

Over the course of years, several authors have been concerned about studying the association between the form of feeding babies and the establishment of deleterious habits, and from these, the development of malocclusion in children.[1,4,5,9,15,17,19,20,23]

The present research consisted of a survey of malocclusions in 5-year-old children who frequented municipal daycare centers, children of parents with a precarious educational level, the majority belonging to the social class C, D and E. Low frequency was found of mothers that breastfed their children naturally for periods that favored the non establishment of deleterious habits and muscular maturation for functional mastication.

In the studied sample, only 4.3% of the children did not present any type of malocclusion; that is, without any anomaly with regard to the bony structures and dental positions. At first sight this result is alarming, considering that 95.7% presented some type of malocclusion, and is in disagreement with the results of other researches, such as Tomita's[26] in pre-schoolchildren from 3 to 5 years old, who found alterations in 50%; Legovic and Ostric[12] who found 46.9%. The lack of a specific index for recording and measuring occlusal problems in this age bracket could be the explanation for these percentage differences between the children of the present study and other researches.

Using the World Health Organization index, it was observed that 58.6% of the children presented slight, and 37.1% moderate/severe malocclusion, totaling 95.7%. Frazão[6] observed that at

5 years of age, 22.9% of children presented slight malocclusion, 26.1% moderate/severe malocclusion, totaling 64.5% of malocclusion and 35.5% of normal occlusion. The project "SB Brasil"[3] found slight malocclusion in 22%, moderate/severe malocclusion in 14.5%, totaling 36.5% of malocclusion and 63.5% of normal occlusion. It was observed that when one added the frequencies of normal occlusion and slight malocclusion in the various surveys, they were close to one another. Probably, the index used for mixed and permanent dentition, and not a specific index for the stage of development of primary dentition is the cause of the differences in the results.

In an endeavor to arrive at a more detailed occlusion status of the sample, the category of the World Health Organization index was analyzed.[16] The data of this research with reference to the survey of malocclusion, relates that as regards the most frequent categories, slight crowding and spacing were found in the sample in 22.8% of the children, open occlusal relationship (open bite) in 24.7%, vertical overlap (overbite) of more than 2 mm in 20.4%, uni or bilateral reverse articulation (crossbite) in 14.8% and positive overjet in 13.0%.

When the terminal classification of molars was used, around 85.0% of the children were classified as having normal molar relationship, showing that in the primary dentition such factors are of little epidemiological relevance, since this anomaly receives a strong genetic influence.[13] Hereditariness or genetics, understood as multiple inheritance of genes, seems to exert a strong influence on the skeletal characteristic of certain cranial-facial dimensions. The influence of genetic aspects is particularly strong for mandibular prognathism,[13] whereas variations in occlusal characteristics appear to be environmentally determined.[7]

When the most frequent malocclusions in the sample were associated to the possible environmental causes of occlusal problems, such as forms of feeding babies and deleterious oral habits, it

was verified that the time of pacifier use was associated with the slight crowding and spacing and open occlusal relationship (open bite) in the univariate analysis. In the logistic regression the time of pacifier use was an indicator of risk for open occlusal relationship (open bite) as the children that used the pacifier for longer than 3 years have 5.25 more chance of presenting open occlusal relationship (open bite) in comparison to the other, results in agreement with those of Serra Negra et al[23] and Tomita.[26] The etiological significance of the predominance of pacifier use in the sample could also be attributed to sociocultural aspects on natural breastfeeding.

The results of the present study showed that 85.0% of the children presented occlusion in a straight molar relationship and the most frequent malocclusions were slight crowding and spacing, open occlusal relationship (open bite), vertical overlap (overbite) of more than 2 mm, uni- or bilateral reverse articulation (crossbite), and positive overjet. Probably, the etiology is environmental in the studied population, showing that these occlusal alterations appear in great frequency such as those found in the researches of Kabue et al[10] and Tschill et al.[27] It is important to point out that when detected, they should receive early interventions, as related by McNamara and Brudon,[14] Planas[18] and Simões.[24]

To sum up, the results of the present research showed that the prevalence of malocclusion in 5-year-old children (60 months) who attend the municipal Daycare Centers in the city of São Pedro, São Paulo, was of an epidemiologically high value (95.7%) in comparison with values in the studied literature. The most frequent malocclusions, in a decreasing order of frequency were as follows: slight crowding or spacing, open occlusal relationship (open bite), vertical overlap (overbite), uni or bilateral reverse articulation (crossbite) and positive overjet. For the molar relationship, the straight terminal plane presents a high epidemiological value, showing a probable

environmental etiology of these malocclusions. There was association between the malocclusions and deleterious oral habits, and pacifier use was shown to influence the development of open occlusal relationship (open bite). Natural breastfeeding for over 6 months (33.3%) and exclusive natural breastfeeding for over 3 months (45.1%) presented low epidemiological values; whereas the presence of deleterious oral habits showed high frequency (95.6%) in the studied population. The time of exclusive breastfeeding was shown to influence the absence of deleterious oral habits.

The results of this and other surveys suggest that the etiology of the majority of malocclusions in adults is environmental, already presenting deviations from normality at the breastfeeding; however, as regards the action on the determinant environmental causes, a specific index is required for measuring the problem. Therefore, the public Health Services could perform actions in the prevention of malocclusion in an organized manner, so that they become economically sustainable and socially accessible, differing from the current situation of offering orthodontic treatments, in the face of the populations needs. Moreover, during the survey of the occlusal status of the sample, it was necessary to use indexes established in other surveys, however, a need was observed for an index that reflects the problem in the initial stages, demonstrating initial deviations from normality both of static and dynamic occlusion for each stage of the child's development. Generally, the indexes used in surveys of occlusion in primary dentition do not consider small deviations from normality, and one has to wait for the problem to develop in order to measure them. One observes that the offer of diagnostic instruments and treatments predominates for acting in the period of mixed or permanent dentition, and that problems in the initial stages of primary dentition are not considered or treated by the oral health team.

Furthermore, studies are suggested for the creation of an index for even younger ages than the

one studied, reaching up to the baby's mode of feeding, which measure deviations from normality that precede the establishment of the malocclusion. It could also be suggested that health system managers and professionals in private clinics include planned and continuous educational actions as regards natural breastfeeding and its implications in the planning and organization of Preventive Orthodontic Programs; as well as interventions at the stage of primary dentition, based on etiologic, morphologic and functional diagnosis to reduce the percentage of malocclusion in the population to more economically bearable and socially acceptable levels, in the mid and long term.

CONCLUSION

The prevalence of malocclusion in 5-year-old children who attend the municipal Daycare Centers in the city of São Pedro, São Paulo, was of an epidemiologically high value (95.7%) in comparison to values in the studied literature. Moreover, the presence of deleterious oral habits also showed high frequency (95.6%) in the population. Significant associations could be observed between some deleterious oral habits and some malocclusions, with emphasis on the time of pacifier use, which was shown to have significant influence and was an indicator of the presence of open occlusal relationship (open bite).

REFERENCES

1. Baldrigui SEZM, Pinzan A, Zwicker CV, Michelini CRS, Barros DR, Elias F. A importância do aleitamento natural na prevenção de alterações miofaciais e ortodônticas. Rev Dental Press Ortod Ortop Facial. 2001;6:111-21.
2. Baume LJ. Physiological tooth migration and its significance for the development of occlusion. I. The biogenetic course of the deciduous dentition. J Dent Res. 1950; 29:123-32.
3. Brasil. Ministério da Saúde. Projeto SB Brasil 2003: condições de saúde bucal da população brasileira 2002-2003. Brasília; 2004.
4. Carvalho GD. Amamentação e o sistema estomatognático. In: Carvalho MR, Tamez RN. Amamentação: bases científicas para a prática profissional. Rio de Janeiro: Guanabara Koogan; 2002. p. 36-49.
5. Fernandes HO. Etiologia das maloclusões dentárias. Rev Bras Odontol. 1994;23:131-37.
6. Frazão P. Epidemiologia da oclusão dentária na infância e os sistemas de saúde. [Tese]. Universidade de São Paulo (SP); 1999.
7. Harris EF, Johnson MG. Heritability of craniometric and occlusal variables: a longitudinal sib analysis. Am J Orthod Dentofacial Orthop. 1991 Mar;99(3):258-68.
8. IBGE. Pesquisa sobre padrões de vida 1996-1997. Rio de Janeiro; 2000.
9. Joseph R. The effect of airway interference on the growth and development of the face, jaws, and dentition. Int J Orofacial Myology. 1982 Jul;8(2):4-9.
10. Kabue MM, Moracha JK, Ng'ang'a PM. Malocclusion in children aged 3-6 years in Nairobi, Kenya. East Afr Med J. 1995 Apr;72(4):210-2.
11. Landis JR, Koch GG. The measurement of observer agreement for categorical data. Biometrics. 1977 Mar;33(1):159-74.
12. Legovic M, Ostric L. The effects of feeding methods on the growth of the jaws in infants. ASDC J Dent Child. 1991 May-Jun;58(3):253-5.
13. Litton SF, Acketman LV, Isaacson RJ, Shapiro BL. A genetic study os Class III malocclusion. Am J Orthod. 1970 Dec;58(6):565-77, 1970.

14. McNamara JA, Brudon NL. Tratamento ortodóncico y ortopédico em la dentición mixta. An Arbor: Needhan Press; 1995.

15. Melsen B, Attina L, Santuari M, Attina A. Relationships between swallowing pattern, mode of respiration, and development of malocclusion. Angle Orthod. 1987 Apr;57(2):113-20.

16. Organização Mundial da Saúde. Unicef. Proteção, promoção e apoio ao aleitamento materno. Genebra; 1987. p. 32.

17. Planas P. Reabilitação neuroclusal. 2ª ed. Rio de Janeiro: Medsi; 1997.

18. Planas P. Rehabilitacion neuro-oclusal (RNO). 2nd ed. Barcelona: Masson-Salvat Odontologia; 1994.

19. Queluz DP, Gimenes CMM. Aleitamento e hábitos deletérios relacionados à oclusão. Rev Paul Odontol. 2000; 22:49-60.

20. Robles FRP, Mendes FM, Haddad AE, Corrêa MSNP. A influência do período de amamentação nos hábitos de sucção persistentes e a ocorrência de maloclusões em crianças com dentição decídua completa. Rev Paul Odontol. 1999;21:4-9.

21. Santos JLB. Prevenção das más oclusões. Curso antagônico. São Paulo: Artes Médicas; 2000. p. 329-53.

22. SAS Institute Inc. SAS user´s guide: statistics. Version 6.0. 4th ed. Cary, NC, USA; 1990.

23. Serra Negra JMC, Pordeus IA, Rocha Junior JF. Estudo da associação entre aleitamento, hábitos bucais e maloclusões. Rev Odontol Univ São Paulo. 1997;11:79-86.

24. Simões WA. Ortopedia funcional dos maxilares através da reabilitação neuroclusal. 3ª ed. São Paulo: Artes Médicas; 2003. v. 1, 2.

25. Simões WA. Ortopedia funcional dos maxilares vista através da reabilitação neuro-oclusal. São Paulo: Santos; 1985.

26. Tomita NE. Relação entre determinantes socioeconômicos e hábitos bucais. Influências na oclusão de pré-escolares de Bauru, Brasil. [Tese]. Universidade de São Paulo (SP);1997.

27. Tschill P, Bacon W, Sonko A. Malocclusion in the deciduous dentition of Caucasian children. Eur J Orthod. 1997;19:361-7.

28. Unicef Brasil. Relatórios. Situação da Infância Brasileira-IDI; 2001.

29. World Health Organization. Oral Health Surveys. Basic Methods. 3rd ed. Geneva; 1987.

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