

Prevalence of malocclusion and associated factors in preschoolers from Salvador-BA in 2019

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Received: 02 October 2021; Accepted: 27 October 2021

Citation: Araújo de Carvalho A, Frederico de Almeida T, Cangussu MCT. Prevalence of malocclusion and associated factors in preschoolers from Salvador-BA in 2019. Oral Health Dental Sci. 2021; 5(4): 1-8.

ABSTRACT

Malocclusion consists of growth and development abnormalities in the relationship between dental arches and / or jaw bones. It usually has a high prevalence in children of preschool age, so it is considered a public health problem. The present study aims to describe the occurrence of malocclusion among preschoolers in Salvador-BA, as well as, to exploratively identify potential factors associated with this problem. This is an epidemiological cross-sectional study involving a random sample of 1577 children in the pre-school age group (36 to 71 months) who attended municipal public daycare centers in Salvador-BA. The study population had a mean age of 54 months and was predominantly composed of blacks / browns (92.02%) and male children (50.29%). The prevalence of malocclusion was 40.46% and the most prevalent condition was open bite (approximately 14%). Digital sucking was performed by 6.73% of the population and 10.39% used pacifiers. Most children (69.43%) do not have the habit of biting objects, and 26.14% gnash their teeth. The protective factors were breastfeeding age ≥ 12 months (PR = 0.63; CI = 0.48- 0.82) and the habit of grinding teeth (PR = 0.7; CI = 0.52- 0.95); and risk factors: digital suction (PR = 5.24; CI = 3.26- 8.41), pacifier (PR = 2.13; CI = 1.27- 3.57), and low insertion of labial frenum (PR = 1.65; CI = 1.15-2.37) Educational measures with family and guardians are essential to reduce prevalence of the disease.

Keywords

Malocclusion, Epidemiology, Preschool.

Introduction

Malocclusion consists of growth and development abnormalities in the relationship between dental arches and/or between maxillary bones with possible reflexes on dental alignment. It can impact quality of life, social relationships, speech and chewing. In addition, muscle and temporomandibular joint could develop pain [1,2]. Its causes include genetic and environmental aspects, since craniofacial development and growth is also influenced by breathing, chewing, sucking and swallowing [3]. It tends to have a high prevalence in preschool-age children, which is why they

are considered a public health problem, also because in this age group preventive measures, of low complexity and/or treatment to deal with the problem are possible [2,4,5]. In Brazil there was a prevalence of 36.46% of occlusal problems at 5 years of age. In the Northeast, this prevalence was 40.09% [6]. In the national survey conducted in 2010, there was a prevalence of normal occlusion with a canine key (class I) in 77.1% of children aged 5 years. Canine class II was present in 16.6% of children and class III in 6.4% [7]. In other studies carried out in the national territory, a prevalence of 32.5% of malocclusion was identified, as in the cross-sectional study with 381 children aged 3-5 years in Diamantina, Minas Gerais [2]. In a cross-sectional study, 63.2% of 6,855 preschool children from 177 Brazilian cities aged 5 years had some occlusal

problems [4]. In a study, Correa-Faria (2013) identified anterior open bite (12.3%) as the most common malocclusion in children aged 61 -71 months, followed by crowding (11.5%), posterior crossbite (10%) and anterior crossbite (10%). A prevalence of 62.4% of malocclusion was found in Campina Grande after a cross-sectional study with 732 aged 3-5 years. Similar prevalence was identified by Bauman in 2018 [2,4]. In the work developed in Rio Grande do Sul, in 2019, a prevalence of 46.2% in the age group of 3-5 years was identified in a cross-sectional study with 93 children. The most frequent occlusal alteration was the open bite (33.3%) [8]. In Brazil, the prevalence of malocclusion can be considered high for this age group, when compared to other countries such as France (21.3%) and Nigeria (32.6%) [9].

Among the variables described in the literature associated with this change in the preschool age group, we can find: anthropometric deficit, non-nutritive and eating habits, eruption disorders, trauma and tooth decay. The longer the habit lasts, the more complex the malocclusion tends to be. However, it is believed that self-correction of malocclusions developed at preschool age may occur with advancing age [4,10,11]. Breastfeeding contributes to adequate craniofacial development, providing an intense muscle stimulus that favors an ideal lip seal with tongue positioning and function. In addition to mobility, strength, posture and development of speech organs [3,5,10]. Early weaning can also be associated with the installation of nutritive sucking habits. A lower prevalence of malocclusions was identified among children who were breastfed. It is concluded that the longer the duration of breastfeeding, the more difficult it is for harmful habits to set in and the lower the prevalence of malocclusion [5]. Non-nutritive sucking habits, such as finger and pacifier sucking, are the most common risk factors for the development of malocclusion [12]. They are also the ones that most commonly persist in children who have not had satisfactory breastfeeding in the early years of life and with social problems [1]. Children who underwent exclusive breastfeeding seem to have a reduced incidence of malocclusion compared to children who used the bottle [10]. The habit of sucking pacifiers and fingers may be related to posterior crossbite and anterior open bite [12].

Mouth breathing is also considered a risk factor and can negatively affect craniofacial development with features such as; elongated face, narrowing of the maxilla, standard class II or III skeleton, open bite and crossbite [3,12]. A positive association between the presence of mouth breathing, deleterious habits and the higher prevalence of malocclusion in children above has already been described in the literature [13]. Studies suggest an association between age and malocclusion. However, findings in the literature that bring a statistically significant association with sex or socioeconomic factors and malocclusion are not common [5,11,14]. The relationship with sex, however, is controversial since findings in the literature identified a statistically significant association between anterior open bite and gender, where male children have a lower prevalence of malocclusion [14], while others identified the same association for females [9]. As well as gender, the relationship between malocclusion and socioeconomic

indicators presents many divergences among authors, and has not been identified in some studies [5,11,14]. However, statistically significant associations were observed with socioeconomic level and malocclusion in children at 5 years, based on variables such as the type of school the child attends (private, public and does not attend) and the mother's work, which can provide distance from the children. However, this same relationship was not recorded when compared to family income [9,15]. Thus, the present study aims to describe the occurrence of malocclusion among preschoolers in Salvador-BA, as well as to exploratively identify potential factors associated with this oral problem.

Methodology

It was developed a cross-sectional epidemiological study that analyzed the oral health situation of 1577 children in the preschool age group (36 to 71 months) who attended municipal public day care centers in Salvador-BA, evaluating the presence of oral health problems such as: dental caries, malocclusion, dentoalveolar trauma and enamel changes, whose data collection took place in 2018 and 2019. The data collection was carried out with the participation of properly trained and calibrated professors and undergraduate students from the Faculty of Dentistry of UFBA. Data were collected by filling out a questionnaire with questions about sociodemographic and behavioral aspects, through individual interviews with the parents/guardians of the participating children and clinical oral examination of the children, using appropriate instruments. All guardians agreed to participate in the research by signing the Informed Consent Form. The following inclusion criteria were established: being between 3 and 5 years old, having complete primary dentition, not having clefts/cleft lip and/or palate, not having health problems or disabilities. The research project was submitted to the Ethics and Research Committee of the Faculty of Dentistry of Federal University of Bahia and approved under register 78351317.0.0000.5024.

The questionnaire covered the variables:

Classification of conditions analyzed in the questionnaire applied to guardians Salvador-BA, 2018-2019	
Sociodemographic variables	Categorization
Age	In months
Skin colour	1-Asian 2-Withe 3-Black and others 9- Not known
Gender	0-Male 1-Female
Education	0-Illiterate 1-Literate 2-Incomplete Elementary 3-Complete Elementary 4- Incomplete High School 5- Complete High School 6- Incomplete College 7- Complete College 8- Pos-graduation 9- Not Known
How many people does the child live with?	Numbers
How many rooms does the house have?	Numbers
How is the house that the child lives?	1- masonry 2- shack 3- Apartament 9- Not known
Pregnancy	1-Planned 2- Casual 9- Not known
Prenatal	0-No 1-Yes 9- Not known
Disease during the pregnancy	0-No 1-Yes 9- Not known

Child's place of birth	1-House 2- Public Hospital 3-Private Hospital 9-Not known
Type of delivery	1-Normal 2-Caesarean 3-Forceps 9- Not known
Time of birth	1-Term 2-Premature 3-Pos-term 9- Not known
Behavioral	Categorization
The child cried at birth	0-No 1-Yes 9- Not known
The child couldn't breath	0-No 1-Yes 9- Not known
Need for hospitalization (after birth)	0-No 1-Yes 9- Not known
Breastfeeding age	In months
Grinding teeth	0-No 1-Yes 9- Not known
Pacifier suction	0-No 1-Yes 9- Not known
Digital suction	0-No 1-Yes 9- Not known
The child bites objects	0-No 1-Yes 9- Not known
Balance feeding	0-No 1-Yes 9- Not known
Does the child have any illness	0-No 1-Yes 9- Not known
Oral health	Categorization
Biofilm	0-No 1-Yes 9- Not known
Calculus	0-No 1-Yes 9- Not known
Dentoalveolar trauma	0-No 1-Yes 9- Not known
Dental caries	0-normal 1-Decay 2-Filles with dental caries 3-Filled 4-Missed 9-Not known
Malocclusion	0- Normal, 1- Mild, 2- Moderate, 3- Severe, 9-Not known
Canine wrench	0-Class I 1-Class II 2-Class III 9-Not known
Overjet	0-Normal 1-Aumentada 2-Topo a Topo 3-Cruzada anterior 9-Sem informaçao
Overbite	0-Normal 1-Reduced 2-open 3-deep 9-Not known
Posterior crossbite	0-Normal 1-Unilateral 2-Bilateral 9-Not known
Changes in enamel structure	0-No 1-Yes 9- Not known
Changes in teeth's anatomy	0-No 1-Yes 9- Not known
Congenitally missing teeth	0-No 1-Yes 9- Not known
Soft tissue changes	0-No 1-Yes 9- Not known
Upper frenum	0-Normal 1-abnormal 9-Not known
Lingual frenum	0-Normal 1-abnormal 9-Not known

Malocclusion was evaluated based on the Angle classification (class I, II and III), and following the Malocclusion Index criteria defined by the World Health Organization (WHO). Also, overjet, overbite, anterior open bite and anterior or posterior crossbite were examined. Descriptive analyzes of categorical and continuous variables were performed in Minitab 17, as well as an exploratory analysis in search of potential factors associated with dental malocclusion. Data were entered into an electronic spreadsheet and analyzed using the chi-square test, with a significance level of 5%, in order to identify independent variables associated with malocclusion. Subsequently, an exploratory bivariate and multivariate analysis was performed in order to establish the risk or protection variables and the risk ratio for malocclusion in children aged 36-71 months.

Multivariate logistic regression analysis was performed including the variables selected from the bivariate model with a significance of up to 20% by stepwise backward, according to the Poisson regression model, with a Hosmer Lemeshow 95% confidence interval to statistical inference.

Results

This study included 1577 preschool children aged 36-71 months (mean 54 months) distributed throughout the city of Salvador-BA. Most were male (50.29%), blacks and browns (92.02%) and children aged up to 54 months (52.57%). Most fathers (52.77%) are up to 35 years old, and 54.70% of mothers are up to 32 years old. The educational level of most mothers (55.86%) and fathers (50.08%) was equal to or higher than elementary school (Table 1).

With regard to housing, 79.60% of the children live in a brick house or shack and 76.94% of them live in dry houses. 77.68% of the study population lives with up to 4 people and 75.87% live in houses with up to 4 rooms. 62.40% of preschool children were born from unplanned pregnancies and only 3.73% of all mothers did not receive prenatal care. Most mothers (85%) did not have any disease during pregnancy, giving birth at the appropriate time of birth (80.34%). At birth, 89.69% of the children cried, 12.3% were bruised and 19.71% needed hospitalization. (Table 1).

Table 1: Description of the study children population in Salvador – BA, 2019, n=1577.

	n	%
Gender		
Male	793	50.29
Female	784	49.71
Skin Colour		
White and others	115	7.98
Black and Brown	1326	92.02
Age (in months)		
Until 54	829	52.57
More than 54	748	47.43
Mother's age		
Until 32 years-old	792	54.70
More than 32 years-old	656	45.30
Father's age		
Until 35 years-old	772	52.77
More than 35 years-old	691	47.23
Father-s education		
Illlitarate- incomplete elementar school	633	49.92
Elementary school or more	635	50.08
Mother's education		
Illlitarate- incomplete elementar school	637	44.14
Elementary school or more	806	55.86
How many persons live in the house?		
Until 4	1176	77.68
More than 4	338	22.32
Rooms at the house		
Until 4	1116	75.87
More than 4	355	24.13
Pregnancy		
Planned	540	37.60
Not planned	896	62.40
Prenatal		
Yes	1419	96.27
No	55	3.73
Mother had disease during pregnancy		
Yes	224	15.00
No	1269	85.00
Place of birth		
House/ Private hospital	271	17.69
Public hospital	1261	82.31

Type of delivery		
Normal/Forceps	867	57.80
Cesarean	633	42.20
Birth time		
In term/ Pos-term	1175	85.89
Premature	193	14.11
Child cried at birth		
Yes	1314	89.69
No	151	10.31
Child didn't breath at birth		
Yes	144	12.30
No	1027	87.70
Child needed hospitalization after birth		
Yes	300	19.71
No	1222	80.29

Most preschoolers were breastfed until 12 months of age. Finger sucking is performed by 6.73% of the population and 10.39% uses pacifiers. Most children (69.43%) do not have the habit of biting objects, and 26.14% grind teeth. No changes in the number of teeth were observed in 99.1% of children. 85.77% and 96.76% of them have superior labial frenulum with normal insertion and normal lingual frenulum, respectively (Table 2).

Table 2: Oral habits and conditions in preschoolers from Salvador-BA, 2019, n=1577.

	n	%
Breastfeeding age		
Until 12 months	810	56.60
12 months or more	621	43.40
Digital suction		
Yes	81	6.73
No	1123	93.27
Pacifier suction		
Yes	154	10.39
No	1328	89.61
Grinding teeth		
Yes	377	26.14
No	1065	73.86
The child bites objects		
Yes	372	30.57
No	845	69.43
Congenitally missing teeth		
Yes	14	99.11
No	1557	0.89
Upper frenum		
Normal	1350	85.77
Not normal	224	14.23
Lingual frenum		
Normal	1522	96.76
Not normal	51	3.24

The prevalence of malocclusion was 40.46%. Canine brace was predominantly normal (89.44%), overjet was normal in 78.89%, as well as overbite (71.70%). Posterior crossbite was not observed in most of the group (92.98%) (Table 3).

Table 3: Prevalence of malocclusions in preschoolers in Salvador-BA, 2019 n=1577.

	n	%
Malocclusion		
No	939	59.54
Yes	638	40.46
Canine wrench (Angle)		
Class I	1398	89.44
Class II	89	5.69
Class III	76	4.86
Overbite		
Normal	1241	78.89
Aumentada	140	8.90
None	107	6.80
Anterior crossbite	85	5.40
Overjet		
Normal	1125	71.70
Lower	50	3.19
Open	220	14.02
Deep	174	11.09
Posterior crossbite		
No	1457	92.98
Unilateral	92	5.87
Bilateral	18	1.15

In table 4, a bivariate analysis was performed. The variables of interest were distributed according to the presence and absence of malocclusion. The variables “father's education”, “how many people he lives with”, “pregnancy” “diseases during pregnancy”, “time of birth”, “breastfeeding age”, “grinding teeth”, “uses a pacifier”, “digital suction”, “nail bit”, “lip brake” and “lingual brake” were selected in order to compose the final multivariate model.

Table 4: Distribution of variables of interest according to the presence of malocclusion in preschool children from Salvador-BA, 2019, n= 1577.

Malocclusion	No		Yes		P-value
	n	%	n	%	
Gender					
Male	472	50.27	321	50.31	0.985
Female	467	49.73	317	49.69	
Skin Colour					
White and others	65	7.58	50	8.56	0.502
Black and Brown	792	92.42	534	91.44	
Age (in months)					
Until 54	487	51.86	342	53.61	0.497
More than 54	452	48.14	296	46.39	
Mother's age					
Until 32 years-old	470	53.78	302	51.27	0.347
More than 32 years-old	404	46.22	287	48.73	
Father's age					
Until 35 years-old	468	54.67	324	54.73	0.983
More than 35 years-old	388	45.33	268	45.27	
Father-s education					
Illiterate- incomplete elementar school	391	51.58	242	47.45	0.149
Elementary school or more	367	48.42	268	52.55	
Mother's education					
Illiterate- incomplete elementar school	374	43.85	263	44.58	0.783
Elementary school or more	479	56.15	327	55.42	
How many persons live in the house?					
Until 4	685	76.03	491	80.10	0.062
More than 4	216	23.97	122	19.90	

Rooms at the house					
Until 4	659	74.80	457	77.46	0.242
More than 4	222	25.20	133	22.54	
Pregnancy					
Planned	340	39.67	200	34.54	0.049
Not planned	517	60.33	379	65.46	
Prenatal					
Yes	847	96.36	572	96.13	0.823
No	32	3.64	23	3.87	
Mother had disease during pregnancy					
Yes	122	13.77	102	16.80	0.107
No	764	86.23	505	83.20	
Place of birth					
House/ Private hospital	159	17.51	112	17.95	0.825
Public hospital	749	82.49	512	82.05	
Type of delivery					
Normal/Forceps	516	57.78	351	57.83	0.666
Cesarean	377	42.22	256	42.17	
Birth time					
In term/ Pos-term	104	12.86	89	15.92	0.109
Premature	705	87.14	470	84.08	
Child cried at birth					
Yes	784	89.81	530	89.53	0.864
No	89	10.19	62	10.47	
Child didn't breath at birth					
Yes	83	11.74	61	13.15	0.473
No	624	88.26	403	86.85	
Child needed hospitalization after birth					
Yes	174	19.31	126	20.29	0.637
No	727	80.69	495	79.71	
Breastfeeding age					
Until 12 months	434	51.24	376	64.38	0.00
12 months or more	413	48.76	208	35.62	
Digital suction					
Yes	248	28.87	129	22.13	0.004
No	611	71.13	454	77.87	
Pacifier suction					
Yes	35	3.99	119	19.67	0.00
No	842	96.01	486	80.33	
Grinding teeth					
Yes	32	4.49	49	9.98	0.00
No	681	95.51	442	90.02	
The child bites objects					
Yes	342	39.18	190	32.09	0.006
No	531	60.82	402	67.91	
Changes in the number of teeth					
Yes	233	68.08	139	28.54	0.210
No	497	31.92	348	71.46	
Upper lip					
Normal	7	0.75	7	1.10	0.469
Not normal	927	99.25	630	98.90	
Tongue lip					
Normal	823	87.83	527	82.73	0.004
Not normal	114	12.17	110	17.27	

In the multivariate analysis (Table 5) the final variables associated with the prevalence of malocclusion were: “breastfeeding age \geq 12 months”, “grinding teeth”, “use a pacifier”, “digital sucking” and “lip brake”. There was a positive association with potential protective factors for the non-occurrence of malocclusions “breastfeeding age \geq 12 months” and “grinding teeth”. In addition, “uses a pacifier”, “digital sucking” and “labial frenum not normal”

were detected with a negative association with malocclusion, thus being potential risk variables.

Table 5: Final Multivariate Logistic Regression Analysis Model for Malocclusion in Preschool Children from Salvador-BA, 2019, n=1577.

Variables	No malocclusion PR	With malocclusion PR	95% CI	P-values
Breastfeeding age \geq 12 months	1.0	0.63	0.48 – 0.82	0.00
Grinding teeth- yes	1.0	0.70	0.52 – 0.95	0.04
Pacifier suction	1.0	5.24	3.26 – 8.41	0.00
Digital suction	1.0	2.13	1.27 – 3.57	0.02
Labial frenum not normal	1.0	1.65	1.15 – 2.37	0.04

Discussion

The prevalence of malocclusion in the study population was 40.46%. Among the variables associated with a higher occurrence of occlusal alterations, breastfeeding age greater than or equal to 12 months and the habit of grinding teeth were identified as protective factors against the development of malocclusion and the use of pacifiers, finger sucking and the presence of low insertion of the labial frenulum were identified as potential factors associated with a higher prevalence of the disease.

In the literature, prevalences for malocclusion in preschool children range from 32.5% to 63.2% are found. The result of the current study (40.46%) is below the values of most studies in the literature, which describe a prevalence of around 50% [2,4,8,11,16].

In the present study, breastfeeding age greater than or equal to 12 months was identified as a protective variable against the development of malocclusions. Exclusive breastfeeding for less than 6 months was associated with a higher prevalence of open bite, therefore, identified as a protective factor against malocclusion [17,18]. From the moment this practice occurs during the first year of life, for 6 months or longer, there is a lower propensity for the development of occlusion disorders that, if they occur in primary dentition, can persist during mixed and permanent dentition [8,17,19].

Also findings in the literature identify the habit as a protection against the installation of deleterious oral habits. It is observed that the early interruption of breastfeeding can lead to an emotional and nutritional compensation mechanism in children, which has the potential to result in harmful habits and, in turn, can favor the appearance of malocclusions [8,17].

In addition, the act of breastfeeding allows facial muscle groups to work and develop, providing an associated development of harmonic occlusion. There is an adaptation of the mouth to the breast, this favors an ideal sealing and breathing, consequently the bite is also favored [8,19].

Early weaning has been seen as something relevant since 1976. Since then, the government has instituted health measures that enable greater adherence to and permanence in natural

breastfeeding. In 1989, the Ministry of Health elaborated the Norm for the Marketing of Food for Infants (NBCAL) in yet another strategy to encourage breastfeeding and against early weaning. Among the causes of early weaning, the following were exposed: “Lack of information from health professionals, mothers and the community; Insufficient structure and routines of health services; Women with salaried work; Disseminated advertising of industrialized foods intended for children [20].”

The NBCAL contains regulations aimed at the commercial promotion and labels of foods intended for babies and children up to 36 months old and ends up providing mothers with information that allows the proper use of each product so that there is no interference with breastfeeding [20].

Also, the Ministry of Health established in 2013, the National Strategy for the Promotion of Breastfeeding and Complementary Food in the Unified Health System. It contributes to the set of measures that encourage the adoption of breastfeeding and healthy eating based on health education [21].

Maternal common mental disorders (CMD) have a statistically significant association with deleterious oral habits, since maternal care is compromised, which could potentially increase the occurrence of occlusal alterations in this age group. Thus, such habits can be installed from emotional disturbances, rejection, anxiety and insecurity [2].

The habit of grinding teeth is characteristic of sleep bruxism, which is a parafunctional habit. A positive association was identified between the habit and the development of malocclusions, being a protective factor. It consists of repetitive muscle activity. Furthermore, bruxism is closely associated with the emotional state of children, and although the habit of grinding teeth may be associated with malocclusion, its association with the occurrence of malocclusions in primary dentition is still scarce in the literature and there was no statistically relationship significant with anterior or posterior crossbite [22,23].

With regard to non-nutritive sucking habits, pacifier and finger sucking were positively associated with the prevalence of malocclusions. As in this study, it was found that the habit of using a pacifier has a relevant association with anterior open bite and posterior crossbite, with the functioning of a risk variable [24,25]. Just as there is a statistically significant relationship between finger sucking and the anterior open bite and posterior crossbite, which may increase the risk of the appearance of open bite up to four times [14,16].

In addition, non-nutritive sucking habits have the ability to influence not only the installation of the anterior open bite, but also changes in the facial profile [14]. It is worth noting that both conventional and orthodontic pacifiers have the potential to contribute to the development of malocclusions. However, for conventional pacifiers the prevalence is higher, it is believed that

this occurs due to the more anatomical shape of the orthodontic pacifier's nipple. Once there is an attempt to reproduce the anatomy of the maternal breast [8]. And, even if the child has been breastfed, there is a greater risk of malocclusion if they were exposure to pacifier suction [18].

According to the literature, the duration of the habit seems to be more relevant than the frequency [24]. In the present study, the use of pacifiers was understood as more harmful, since the habit represents 5x more risk of developing malocclusion and finger sucking around 2x more risk. Findings suggest that finger sucking, however, may cause a higher prevalence of occlusal alterations than pacifier sucking. Since abandoning the habit of using a pacifier would be easier than using finger sucking [8].

The use of orthodontic pacifiers can be favorable to reducing the installation of malocclusions, as well as reducing the risk of developing harmful habits such as conventional pacifier sucking and digital sucking [27]. It should be noted that to measure the consequences of these habits, it should observe the frequency, intensity and duration of each one (Graber's Triad) [2,5].

As well as sucking, non-nutritive, unbalanced and inefficient chewing of objects can favor the appearance of malocclusions-low tongue posture may be associated with class II and III malocclusions [10]. Furthermore, preterm delivery and birth in a small size for gestational age may be related to malocclusions. Premature birth for posterior crossbite and birth in a smaller size for gestational age are a possible protective factor [12].

Regarding the presence of labial frenulum with low insertion, there is a risk relation for malocclusions found in the current study. There is 1.6x more chance of developing interincisor diastemas. Interincisor diastemas are present in many children during primary dentition, but tends to close until the eruption of the upper permanent canines. However, from this eruption, the non-correction of the diastema may be strongly associated with the low insertion of the labial frenulum [28,29]. In addition to malocclusions, the low insertion of the labial frenulum can make hygiene, phonation difficult and lead to the accumulation of biofilm [30].

Even with the findings, it should always be taken into account that genetic and hereditary factors can interfere with the development of occlusion abnormalities, which were not included in this study, due to its cross-sectional characteristic. Also, the eating and harmful habits here were self-reported by the guardian, being possible the presence of information bias. It is highlighted as a limitation of the study the lack of response in some variables analyzed in the study, which may have the potential to interfere with the results, underestimating the findings of this study.

Despite the limits, it is important to consider the relevance of the present study for the knowledge of malocclusions in the city of Salvador, and its population and representative character in

relation to its prevalence and associated factors. Thus, these data can provide the development of intervention measures to control and reduce the alterations. In addition, the study provided the basis for future research addressing the parafunctional habit of bruxism and the presence of low insertion of the labial frenulum and its association with malocclusions that are still scarce in the literature.

Conclusion

Preschoolers in Salvador-BA showed a prevalence of malocclusions of 40.46%. Canine brace, overjet and overbite were predominantly normal. The most prevalent malocclusion was open bite, affecting 14% of the study population. Furthermore, breastfeeding age ≥ 12 months and the habit of grinding teeth were identified as protective factors against the development of malocclusions. As positive associated factors, the habit of finger and pacifier sucking and low insertion of the labial frenulum were identified. Therefore, educational measures aimed at the family and those responsible are essential to reduce these habits and the prevalence of the disease.

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