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Nonnutritive sucking habits among preschool-aged children

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Abstract

Objective: To verify the prevalence and factors associated with nonnutritive sucking habits in preschool-aged children attending daycare centers and preschools in Natal, Brazil.

Methods: A cross-sectional study was conducted with 1,190 children of both sexes, aged 3 to 5 years, enrolled in daycare centers and preschools in Natal, Brazil. Exclusion criteria were: children with cleft lip and palate, temporomandibular joint disorders, or submitted to orthodontic and/or orthopedic treatment; as well as institutions specialized in children with disabilities. Parents or guardians answered a structured questionnaire providing information on the institution, children's sex and age, parents' educational level, and habit-related questions. Data analysis was performed using the chi-square test and logistic regression.

Results: A prevalence of 40.2% of nonnutritive sucking habits was obtained; of these, 27.7% were pacifier-sucking and 12.5% were finger-sucking habits. Girls showed a higher percentage of sucking habits, especially finger sucking ($p = 0.02$); younger children showed a higher prevalence of pacifier-sucking habits ($p = 0.0006$). A higher frequency of pacifier- and finger-sucking habits was associated, respectively, with parents' higher education ($p < 0.05$) and elementary education ($p < 0.05$). Logistic regression revealed that younger individuals ($p = 0.033$) and secondary education level of parents ($p = 0.035$) are independent factors for habit persistence.

Conclusion: A high prevalence of nonnutritive sucking habits was verified, highlighting younger age groups and secondary education level of parents as important associated factors.

J Pediatr (Rio J). 2009;85(5):408-414: Sucking behavior, prevalence studies, preschool-aged children.

Introduction

Habits are acquired automatisms, represented by an altered pattern of muscle contraction with complex characteristics, which proceed unconsciously and in a regular basis.[1] Some habits occur in the oral region and may have harmful effects on health, promoting changes in dental, bone and muscle tissues,[1] their development being determined by intensity, frequency and duration of inappropriate pressure.[2]

The prevalence of nonnutritive sucking habits among preschool-aged children found in the literature ranges from 17[3] to 50%.[4] This high percentage is commonly associated with some social factors, such as family income, parents' educational level, and difficult access to dental services.[5] Another relevant aspect is the interference of cultural aspects, such as pacifier use, a deep-rooted habit in Brazil, even among populations advised to avoid its use.[6] This fact

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translates into a high prevalence of pacifier use among children in Brazil's capital cities (60.3%).[7]

Regarding etiologic factors, we draw attention to psychological and environmental disorders (emotional deprivation, need for attention),[8] as well as to the reasons for inappropriate sucking during the first years of life, such as an infant submitted to none or a short period of breastfeeding.[5,9] This fact has been widely studied in the health area, since its causes and effects are not limited to the oral cavity.

The sucking habit is of utmost importance for newborn infants, who are dependent on spontaneous oral sucking to promote their nutritional fulfillment. During sucking, lips, tongue and oral mucosa experience a sensation of pleasure which develops the first psychological functions and interpersonal relationships (mother-infant bond), enabling the infant to explore the socioenvironmental surroundings.[10]

During this phase, which may reach the age of three and a half years, sucking is part of the normal development of the child, playing a role in muscle strengthening and dentofacial growth. This is the first coordinated activity in childhood.

However, persistent sucking habits after this phase are considered to hinder the development of facial bones and may be an indicative of behavioral problems.[11] Based on the complexity involving both the development and extension of nonnutritive sucking habits, as well as the need to adopt preventive measures against these sucking habits, further investigation is warranted to clarify the frequency of these events in the pediatric population. As the main consequence, they result, at the dental level, in dental and facial changes.

Therefore, the present study aimed to verify the prevalence and factors associated with nonnutritive oral sucking habits among 3-5-year-old children attending daycare centers and preschools in the city of Natal, northeastern Brazil.

Methods

A cross-sectional epidemiologic study with children of both sexes, aged 3 to 5 years, attending public and private daycare centers and preschools in Natal, Brazil, a city of 774,230 inhabitants, HDI 0.788, and *per capita* income of 2.25 minimum wages.[12]

Exclusion criteria were: children with cleft lip and palate, temporomandibular joint disorders, or submitted to orthodontic and/or orthopedic treatment; as well as institutions specialized in children with disabilities.

In order to calculate the sample size, we used the estimate of prevalence of pacifier sucking obtained from a pilot study. In public institutions, estimated prevalence was 39%, and, in private institutions, it was 54%. The pilot study was conducted in 10 (5 public and 5 private) schools distributed throughout the 5 geographic areas of the city of Natal (North, South, Central, East, and West), using a stratified sampling technique. The sample was stratified into two groups: the first group (stratum 1) defined as children attending public schools, and the second group (stratum 2) as children attending private schools. The sample was based on the total population of 28,835, distributed as n_1 = 13,408 public school children and n_2 = 15,427 private school children. Thus, using a pacifier-sucking prevalence estimation error limit of 2.74% and prevalence estimates obtained from the pilot study, through the stratified sampling formula with Neyman allocation, we obtained n = 1,190, with sample size of strata expressed as n_1 = 547 (0.46) and n_2 = 643 (0.54).

Altogether, as primary sampling units, 304 schools registered in the City Department of Education in 2004 participated in the study, totaling 28,835 children aged 3 to 5 years. Of the 304 institutions, 20 public and 20 private schools were randomly selected, a number of units considered ideal and operationally feasible.[13]

Sample randomization was carried out by casual systematic drawing lots technique. For this purpose, a list of public and a list of private schools were drawn up. After drawing lots, the sample of children by stratum was distributed randomly and proportionally to the total number of students in each unit selected.

To obtain a sample interval, the total value obtained was divided by the sample size required. In public schools, for example, total value was 2,575 children; therefore, sample interval was 2,575 / 595 = 4.3.

Data collection was performed by means of a pretested questionnaire, which was handed out to parents or guardians when they dropped their children at the daycare center/preschool. They were requested to return the questionnaire on the following day. The instrument was composed of closed-ended questions with only one choice to be selected. The main questions concerned whether the child had pacifier- or digit-sucking habits; when the child performed each habit (only at night or during night and day); sex; age (3, 4 or 5 years); parents' educational level (elementary, secondary or higher education); and type of institution (private or public school).

Data analysis was performed using the chi-square test and logistic regression with the Statistical Package for the Social Sciences (SPSS), version 10.0 for Windows. Significance level was set at $p < 0.05$ for all analyses.

At each participating institution, previously approved questionnaires were handed out together with a written consent form. The return of the questionnaire, together with the signed or fingerprinted written consent form, was considered, for legal purposes, as the parents' or guardians'

authorization for the child participation in the study. The present study thoroughly followed the guidelines approved by the Research Ethics Committee of Universidade Federal do Rio Grande do Norte (UFRN) (CEP-UFRN, report no. 157/03).

Results

A total of 517 girls and 583 boys participated in the study, 576 of them attending public schools and 524 attending private schools. Of the 1,190 questionnaires handed out, 1,100 were returned, with a loss of 90 questionnaires, i.e., 7.56%. However, some of the questionnaires returned were not completely filled out, as some variables were lacking answers. The sample comprised 226, 413 and 437 children aged 3, 4 and 5 years, respectively.

Data from the questionnaire revealed 40.2% of children with nonnutritive sucking habits, 27.7% were pacifier-sucking and 12.5% were finger-sucking habits.

Regarding the period when nonnutritive sucking habits were performed, a higher percentage was observed in the night/day group (26.50%) in relation to the only-at-night group (7.40%).

In the bivariate analysis, the results indicated a reduction in the prevalence of sucking habits as children grow older, revealing that 48.2% of the 3-year-old children had nonnutritive sucking habits against 37.8 and 38.9% of 4- and 5-year-old children, respectively, this difference being statistically significant (p = 0.025). Regarding sex, sucking habits were more prevalent among girls (43.7%), with a statistically significant difference (p = 0.031). Regarding parents' educational level, an association was observed between secondary education and less nonnutritive sucking habits. However, regarding type of institution, there was no statistically significant difference (p = 0.424). (Table 1).

Table 2 shows an association between the use of pacifier and parents' higher educational level (p = 0.006) and younger children (p = 0.006). In the analysis between sex and pacifier use, there was no statistically significant association (p = 0.421).

With regard to digit sucking, children whose parents had elementary education were more likely to show persistent habit (p < 0.05). Similarly, girls showed a higher rate of

Table 1 - Distribution of children with nonnutritive sucking habits, according to age, sex, parents' educational level, and type of school (Natal, Brazil, 2005)

Variable	Nonnutritive sucking habits		Total	p*	OR	95%CI
	Yes, n (%)	No, n (%)				
Age (years)						
3	109 (48.2)	117 (51.8)	226		1.460	1.06-2.02
4	156 (37.8)	257 (62.2)	413		1	–
5	170 (38.9)	267 (61.1)	437	0.025	1.049	0.795-1.383
Sex						
Male	217 (37.2)	366 (62.8)	583			
Female	226 (43.7)	291 (56.3)	517	0.031	0.763	0.600-0.972
Mother's educational level						
Elementary education†	230 (41.7)	321 (58.3)	551		1.195	1.006-1.420
Secondary education†	125 (34.9)	233 (65.1)	358		1	–
Higher education†	78 (46.4)	90 (53.6)	168	0.025	1.215	1.035-1.426
Father's educational level						
Elementary education†	238 (42.9)	317 (57.1)	551		1.324	1.100-1.592
Secondary education†	104 (32.4)	217 (67.6)	358		1	–
Higher education†	73 (43.2)	96 (56.8)	168	0.006	1.587	1.081-2.329
Type of school						
Public	225 (39.1)	351 (60.9)	576			
Private	218 (41.6)	306 (58.4)	524	0.391	1.111	0.843-1.415

95%CI = 95% confidence interval; OR = odds ratio.
* Chi-square.
† Complete or incomplete.
Elementary education corresponds to 0 to 8 years of education.
Secondary education corresponds to 9 to 11 years of education.
Higher education corresponds to 12 or more years of education.

habit persistence regarding digit sucking (p = 0.020). The association between age and finger sucking failed to show statistical significance, although the 5-year-old group presented a higher percentage in relation to the other age groups (Table 2).

Multiple regression analysis revealed that younger individuals (p = 0.033) and secondary education level of parents (p = 0.035) are independent factors for harmful habits, secondary education persisting as a protection factor [odds ratio (OR) = 0.74]. With regard to sex, in male participants the effect was lost, i.e., failed to show significance (Table 3).

Discussion

Nonnutritive sucking habits have aroused considerable interest because of their association with dental occlusion disorders and the child behavior as a whole. Within such a context, knowledge about the prevalence and factors associated with the development and persistence of these habits is of paramount importance.

In the present study, we found a high prevalence of nonnutritive sucking habits. It is worth mentioning that reports from the literature show a high variability of habit prevalence,[14,15] which might be related to the methodological diversity observed in such studies. Sample size calculation, for example, was not carried out in most studies, despite being considered an essential phase in prevalence studies. In addition, information on data losses was not provided. Therefore, it is difficult to establish comparisons, since this type of results does not always represent the population investigated.

Population differences observed in these studies are also a factor affecting the results, since there are several specific aspects regarding diet, habits, family relationship, and, ultimately, aspects related to culture in general. In that

Table 2 - Distribution of children with pacifier- and finger-sucking habits, according to age, sex, parents' educational level, and type of school (Natal, Brazil, 2005)

Variable	Pacifier					Finger				
	Yes n (%)	No n (%)	p*	OR	95%CI	Yes n (%)	No n (%)	p*	OR	95%CI
Age										
3	83 (36.9)	142 (63.1)		1.55	1.09-2.20	27 (12.1)	197 (87.9)		1	–
4	112 (27.3)	298 (72.7)		0.99	0.66-1.22	51 (12.3)	362 (87.7)		1.26	0.85-1.87
5	110 (25.2)	326 (74.8)	0.006	1	–	66 (15.1)	371 (84.9)	0.400	1.29	0.80-2.09
Sex										
Male	162 (27.8)	421 (72.2)				61 (10.6)	516 (89.4)			
Female	55 (30.0)	362 (70.0)	0.421	1.11	0.86-1.44	77 (15.2)	430 (84.8)	0.020	1.51	1.06-2.17
Mother's educational level										
Elementary education†	155 (28.4)	391 (71.6)		1.20	0.89-1.63	81 (14.9)	462 (85.1)		1.93	1.06-3.50
Secondary education†	88 (24.6)	269 (75.4)		1	–	39 (11.1)	313 (88.9)		1.40	0.93-2.11
Higher education†	64 (38.1)	104 (61.9)	0.006	1.55	1.08-2.23	14 (8.3)	154 (91.7)	0.050	1	–
Father's educational level										
Elementary education†	157 (28.5)	394 (71.5)		1.39	0.97-2.01	86 (16.6)	464 (84.4)		2.41	1.28-4.53
Secondary education†	72 (22.6)	247 (77.4)		1	–	34 (10.8)	281 (89.2)		1.53	1.00-2.34
Higher education†	61 (36.1)	108 (63.9)	0.006	1.92	1.27-2.88	12 (7.1)	156 (92.9)	0.007	1	–
Type of school										
Public	164 (28.5)	412 (71.5)				78 (13.6)	494 (86.4)			
Private	153 (29.2)	371 (70.8)	0.791	0.96	0.74-1.25	66 (12.6)	458 (87.40)	0.610	1.09	0.77-1.55

95%CI = 95% confidence interval; OR = odds ratio.
* Chi-square
† Complete or incomplete.
Elementary education corresponds to 0 to 8 years of education.
Secondary education corresponds to 9 to 11 years of education.
Higher education corresponds to 12 or more years of education.

Table 3 - Logistic regression model for nonnutritive sucking habits (Natal, Brazil, 2005)

Variable	General OR	95%CI (general OR)	p*	Adjusted OR	95%CI (adjusted OR)	p*
Sex						
Male						
Female	0.763	0.60-0.97	0.031	1.130	0.99-1.63	0.05
Age						
3 years	1.46	1.06-2.02		1.43	1.03-1.98	
4 years	0.95	0.72-1.26		0.93	0.70-1.23	
5 years	1	–	0.025	1	–	0.033
Mother's educational level						
Elementary education†	1	–		1	–	
Secondary education†	0.75	0.57-0.98		0.74	0.56-0.98	
Higher education†	1.21	0.85-1.71	0.025	1.16	0.81-1.65	0.035

95%CI = 95% confidence interval; OR = odds ratio.
* Chi-square.
† Complete or incomplete.
Hosmer and Lemeshow test, p = 0.938.
Elementary education corresponds to 0 to 8 years of education.
Secondary education corresponds to 9 to 11 years of education.
Higher education corresponds to 12 or more years of education.

sense, it is important to highlight that the investigations selected analyzed populations from less developed countries such as Senegal,[3] Brazil,[4,16] Saudi Arabia,[17] and India.[18]

Even in face of such population particularities, in the present study there also was an expressive prevalence of nonnutritive sucking habits among preschool-aged children (3-5 years old), the habit of using pacifiers being more common than digit sucking.[4,18] However, studies with participants aged more than 5 years verified a higher frequency of finger sucking in relation to other harmful oral habits.[19,20] Since the finger is always more accessible than the pacifier, it seems likely that children will have greater trouble ceasing the finger-sucking habit.[21] As a general rule, there is a lower association between nonnutritive sucking habits and children growing older, regardless of the type of sucking habit (pacifier or finger).[4,14]

The psychoanalytic theory suggests that, as children grow older, they tend to abandon self-erotic habits previously associated with pleasure zones, such as those related to the mouth during the oral phase.[8] Thus, most children would be expected to cease nonnutritive sucking habits as soon as their psychological development process started, around the age of 3 years. Habits persisting after early childhood may then be a sign of psychological disorders. Such disorders might be seen as a lack of ability to deal with situations of emotional stress, and children often exhibit an anxiety reaction that, in most cases, is expressed as a return to child behavior. Therefore, after the age of 3 years, children, in general, are expected to be able to abandon nonnutritive sucking habits.

In that sense, breastfeeding, in addition to being a mechanism that enhances the development and strengthening of muscles and bone structure, contributes to the child emotional maturity, which is of great assistance in the prevention of nonnutritive sucking habits. However, breastfeeding has been influenced by social and economic factors motivated by the increased participation of women in the job market, thus affecting the mother-child relationship.[5] Moreover, a higher frequency of pacifier use can be observed as a result from a modern lifestyle, growing industrialization, and sociocultural aspects,[22] since this object is easily accessible to all social classes and its use by the nursing infant is associated with a reduced duration of breastfeeding.[9]

Although the association between nonnutritive oral sucking habits and sex was not confirmed by multiple analysis, we found a higher prevalence of the digit-sucking habit among girls, which is in agreement with the findings from other studies.[4,18] On the other hand, some authors reported that there was no relation between sex and prevalence of sucking habits,[20,23] a higher frequency of these habits being even observed among boys.[15] In view of these controversial results and the lack of an acceptable reason for such difference, studies investigating psychological and cultural differences that include both sexes might better explain the issue in question.

The results related to the social indicator – parents' educational level – were difficult to analyze since only secondary education level of mothers showed an independent effect on nonnutritive sucking habits.

Regarding data found in the literature, we could observe controversial results. Oliveira,[19] for example, failed to find any differences concerning the development of sucking habits among children whose parents have different educational backgrounds.

However, when nonnutritive sucking habits were analyzed in separate, digit sucking showed a higher prevalence among lower educational levels, which is in agreement with Paunio et al.[20] and Larsson,[24] who obtained similar findings.

By contrast, we detected a higher frequency of pacifier sucking among children whose parents had a higher educational level. On the other hand, Tomita et al.[25] verified that the frequency of children with the above-mentioned habit showed a declining trend with the increase in breastfeeding, whereas the digit-sucking habit failed to show an association with the mother's educational level.

Therefore, regarding the relationship between educational level and sucking habits, it is possible to assume that, regardless of educational level, cultural implications play a relevant role in the development of nonnutritive sucking habits, and further investigation is warranted to clarify this issue.

The type of school, which, in principle, would reflect the socioeconomic status of the family, failed to show an association with frequency of nonnutritive sucking habits, thus hindering the discussion of the relationship between social determinants and oral habits.

Such difficulty may be attributed to limitations inherent to quantitative studies, as the causal relations of the findings concerning social indicators are superficial and present a fragmented view of the reality. Furthermore, psychological and structural aspects of the family should be considered as a major determinant factor.[25]

The frequency and duration of the habit often promote dental changes; thus, the more frequent and longer lasting the habit, the greater the resulting changes will be.[2] Therefore, in order to infer the level of dental/jaw impairment resulting from nonnutritive sucking habits in the study population, these two aspects were analyzed. The findings revealed a high frequency of nonnutritive sucking habits performed during night and day, suggesting the possibility of future occlusal problems in these children.

The relationship between digit- and pacifier-sucking habits and the development of malocclusion has been previously demonstrated,[26,27] ranking third among the major oral health problems.[28] In the most recent epidemiological surveillance of oral health carried out in Brazil (SB Brazil 2003), 58.14% of the 12-year-old children showed some occlusal alteration.[29]

This fact highlights the need to better understand the reasons for such a high prevalence and the intensity of sucking habits, providing continuous guidance to parents and guardians on the prevention of these habits, and, ultimately, in the event of compromised development of the dental arches, interceptive and rehabilitation treatment should be rendered.

Therefore, in face of the high prevalence of nonnutritive sucking habits in our study population, we emphasize the importance to deepen our knowledge of psychosocial determinants, and, for this purpose, it might be necessary to interact with several knowledge fields, such as medicine, dentistry, psychology, anthropology, and speech therapy, in order to provide a better understanding of the causes and consequences of persistent sucking habits.

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