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## Associations Between a History of Breast Feeding, Malocclusion and Parafunctional Habits in Puerto Rican Children

LYDIA M. LÓPEZ DEL VALLE, DMD MPH\*; G. DAVE SINGH, DDSC, PhD, BDS†;  
NILMA FELICIANO, DMD FAAP‡; MARÍA DEL CARMEN MACHUCA, MD, DMD, MPH, MDS\*\*

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Studies relating breast-feeding, malocclusion and parafunctional habits in young children are scarce.

**Purpose.** The purpose of this study is to evaluate the associations of a history of breast-feeding, incidence of malocclusion and parafunctional habits.

**Methods.** The dental records of a sample of 540 children aged 6 to 72 months screened for oral conditions and behavioral risk factors were evaluated for variables such as a history of breastfeeding, malocclusion and parafunctional habits. Descriptive statistics using the EPI-INFO Program and Chi-square test at the 0.05 level of probability were performed.

**Results.** The results showed that the mean age of the children was 28 months  $\pm$  14. The mothers' mean age was 26.4 years  $\pm$  6. The prevalence of breast-feeding was 34% with a mean breast-feeding time period of 3 m  $\pm$  3.7. About 95% of the children had a history of bottle-feeding and 90% showed some evidence of

malocclusion at the time of dental examination. The main malocclusion problems were space deficiency (closed contacts among incisors) (31%), open bites (6%) and crossbites (5%). A habit of thumb sucking was reported in 32% of the cases and pacifier use in 21%. There were significant differences for the following variables: mother's age and breast-feeding time period; number of children in family and breast-feeding time period; breast-feeding history and breast-feeding time with bottle use, malocclusion and thumb sucking habit; and gender and thumb-sucking habit.

**Conclusion.** It is concluded that breast-feeding practices and time period are behavioral factors that contribute in the prevention of malocclusion in addition to decreasing the practice of parafunctional habits in preschool children.

**Key words:** Breast-feeding practices, Malocclusion, NNS habits, Preschool children

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**T**here is increasing evidence that poor nutrition/feeding behaviors in childhood are associated with adverse short-term and long-term consequences, such as poor immune status, higher caries rate, poor cognitive function/learning ability, and the development of malocclusions (1). In contrast, breast-feeding has been associated with improved nutrition, more effective immune system and a healthier status during child development

(2). But, the prevalence of breast-feeding varies among populations (3). King (4) studying a population of 4 year old Indian children in Hong Kong showed that 99% of mothers breast-fed their children (5% exclusively). As well, socio economic level is associated with the frequency of breast-feeding and when the child is breast-fed. For example, mothers from upper socio economic levels breast-fed less frequently than mothers from lower socio economic in South African families (5), while in Puerto Rican and Mexican cultures, mothers from lower socio economic levels breast-fed less than mothers in the upper socio economic level (6,7,8).

It is thought that breast-feeding may be beneficial for jaw development, as sucking involves mandibular movements and the tongue exerting upward and outward forces on the mother's breast, which affects the infant's premaxillary region. Indeed, opinion is emerging that posterior-acting forces of the buccinators during bottle-feeding, pacifier-use and digit-sucking oppose forward-

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\*Associate Professor, Deanship of Research, University of Puerto Rico School of Dentistry, †Associate Professor, Center for Craniofacial Disorders, University of Puerto Rico School of Medicine, ‡Professor, UPR Pediatric Dentistry Residency Program, University of Puerto Rico School of Dentistry, \*\*Assistant Professor, Ecological Sciences Department, University of Puerto Rico School of Dentistry

Address correspondence to: Dr. Lydia M. López del Valle, University Of Puerto Rico, School of Dentistry, San Juan, Puerto Rico, P.O. Box 365067, San Juan, Puerto Rico, 00936, Phone: 787-758-2525 exts. 2069, 1136 or 1139, Fax: 787-763-4868, E-mail: [LLOPEZ@RCM.UPR.EDU](mailto:LLOPEZ@RCM.UPR.EDU)

acting forces of sucking during breast-feeding (9). In addition, a higher proportion of distal canine relationships was found in children who sucked pacifiers and dummies at the age of 3 years (10). This finding suggests that bottle-feeding induces a pattern of low-impact muscular activity that may interfere with the normal development of alveolar ridges and the anterior palate, and hence lead to posterior crossbite. As well, open-bites are demonstrable often in children with sucking-habits (11), and these habits are reported to be strongly associated with malocclusions (12). For example, two years of (pacifier) dummy-sucking can decrease the upper inter-canine arch width (13).

Dental professionals are generally aware of the oral implications of the parafunctional habits noted above, which are also known as non-nutritive sucking (NNS) habits. Non-nutritive sucking habits have a reported prevalence of 20% to 30% (3). Early studies demonstrated that digit or pacifier NNS habits can produce skeletal changes in the developing occlusion, leading to open bites, excessive overjet and posterior crossbites. These NNS can soothe infants and assist young children transitioning to sleep; they also help alleviate the discomfort of teething, and provide comfort during stressful episodes. New evidence has related NNS habits with different types of malocclusion and to a history of breast-feeding during early childhood. Therefore, the aim of this study is to evaluate the association of a history of breast-feeding, the incidence of malocclusion, and parafunctional habits such as NNS habits in a sample of Puerto Rican preschool children.

## Methods

This investigation is part of 3 previous studies whose protocol was reviewed and approved by the IRB Medical Sciences Campus, UPR. Details of the method employed have been described previously (6). A cross-sectional study of a sample of 540 children aged 6 to 72 months from the Head Start and WIC Programs of the North East region of Puerto Rico was performed. The northeast region of the island was selected for the studies based on accessibility and willingness to collaborate. The children were examined between 1993 and 2001 as part of studies on early childhood caries. On site, parents or caretakers were interviewed, and a dental examination of the child was conducted after a consent form had been signed. A calibrated dentist and four trained interviewers conducted the dental evaluation and behavioral risk factors' questionnaire. Dental examinations were conducted by visual methods with a pen light and dental mirror. Evaluation and diagnosis of occlusion was part of the full clinical examination. Malocclusion was defined as

presence of open bite, cross bites, space deficiency (closed contacts among incisors), as well as abnormal canine and molar relationship. Mothers or caretakers completed a structured, validated Spanish-translated questionnaire on history of breast-feeding, type of breast-feeding practices and parafunctional (NNS) habits in their children. Statistical analyses double entered in the EPI-INFO program were performed. Descriptive statistics, Chi-Square and Fisher's exact tests for bivariate associations between behaviors and malocclusion were performed at the 0.05 level of probability.

## Results

The sample consisted of 540 children aged 6 to 60 months; 52% were female and 48% were male. The children's mean age was  $26 \text{ m} \pm 14$ . The mother's age ranged from 14 to 40 years, with a mean age of  $26 \text{ yrs} \pm 6$ . The mean number of children per family was  $2 \pm 1$ .

The mother's age was related to the number of children per family, NNS habits and consequently to the type of malocclusion. In contrast, no relation was found between the mother's age and breast-feeding practices ( $p = 0.44$ ). However, the time period of breast-feeding was related to mother's age, indicating that increased age was related to longer breast-feeding time periods.

The number of children per family was related to gender, breast-feeding practices and time period, and NNS habits. An increased number of children in the family was related to female gender ( $p=0.009$ ), less breast-feeding ( $p= 0.00$ ), presence of malocclusion and NNS habits.

The child's age was related to breast-feeding practices and the breast-feeding time period, the presence of NNS habits, and types of malocclusion. Only about 35% of the children were breast-fed, with a mean breast-feeding time period of  $3 \text{ m} \pm 3$ . The NNS habits reported were about: 94% for bottle-use, 24% for pacifier use, and 23% for thumb sucking. Significant statistical differences were found also for gender and NNS habits ( $p= 0.018$ ). Boys tended to use pacifiers more often than girls.

A history of breast-feeding was positively associated with a longer breast-feeding time period ( $p = 0.00$ ), less bottle use ( $p = 0.02$ ) and normal occlusion ( $p = 0.004$ ). In turn, shorter breast-feeding time period showed a tendency to be related to practice of NNS habits, bottle-use and type of occlusion.

The types of malocclusion found were about: 31% with Class I malocclusion; 19% with closed contacts between the incisors or no presence of primate spaces in the anterior segment; 28% with anterior open bite, and 11% with crossbites. Thus, nearly 90% of children in this sample had evidence of malocclusion by 5 years of age.

## Discussion

The American Academy of Pediatric Dentistry (AAPD) endorses the American Academy of Pediatrics (AAP) policy on breast-feeding, but recognizes the need for further research regarding the effects of breast-feeding on dentofacial growth and oral health (14). Therefore, the aim of this study was to evaluate the association of nutrition/feeding behaviors in a sample of Puerto Rican preschool children. Several trends in the early pattern of feeding were identified. First, there has been a trend to stay away from breast-feeding and to use bottle-feeding instead, with 94% of children being bottle-fed according to the findings of this study. Only about 35% of the children in this survey were breast-fed, and as the number of children in the family increased, the likelihood of breast-feeding decreased further. Given these changes in early feeding behavior, it is likely that these changes may result in the early development of malocclusion, in accord with the functional matrix hypothesis (1,15). Indeed, in this present study, a history of breast-feeding was associated with the development of a normal occlusion. It has been suggested also that pacifier or digit use be curtailed beginning at 2 years of age and that pacifier or digit habits be discontinued by or before age 4 years to minimize the development of malocclusion. Warren (16) showed that NNS habits are found from infancy through the second year of life in the majority of children. In addition, over 20% have prolonged NNS habits at 36 and/or 48 months of age, a finding that correlates well with the results of this present study. Earlier, Johnson (17) reported that the patient's gender is related to the type of NNS habit. In general, NNS habits are more severe in girls than in boys. This finding was also corroborated in our present study.

Adair (18) observed that children with a NNS habit have larger overjets, primary canines in a Class II relation, distal step molars, open-bites and posterior crossbites. From our results the types of malocclusion found were: 31% with Class I malocclusion; 19% with space deficiency; 28% with anterior open bite, and 11% with cross-bites. Thus, nearly 90% of the children in this sample have evidence of malocclusion by 5 years of age. Zardetto (19) evaluated the characteristics of dental arches and some oral myofunctional structures in children aged 36 to 60 months with and without pacifier sucking habits. The results showed that posterior crossbite was present only in children who had pacifier-sucking habit; intercanine distance of the upper arch was significantly smaller in children who sucked pacifiers than those who did not; and the children who never sucked on a pacifier showed a higher prevalence of normality of cheek mobility and hard palate shape. Thus, it is concluded that children who

suck pacifiers, both conventional and physiological ones, will show a higher prevalence of alterations in the relationship of the dental arches and oral myofunctional structures, laying the foundations for the development of malocclusions.

Warren (20) studying the association between the duration of nutritive and NNS behaviors and various occlusal characteristics in the primary dentition found that prolonged pacifier habits resulted in changes to the dental arches and occlusal parameters. Earlier, Johnson (18) reviewed causes, risks, prevalence and contributing factors of NNS, showing that thumb sucking and finger sucking seemed to be influenced by many culturally and socially dependent factors, most notably by child-rearing practices. This may also be the case in Puerto Rico. Moreover, dental professionals should be aware of other risks and benefits of pacifier use, some of which are controversial. These include: an association with protection against sudden infant death syndrome (SIDS), an association with reduced prevalence and reduced duration of breast-feeding, and an increased risk for otitis media infections.

## Conclusions

There is a significant association between breast-feeding history, malocclusion and parafunctional habits (NNS) in Puerto Rican children.

Breast-feeding practices should be encouraged and facilitated in mothers in order to reduce NNS habits and subsequent malocclusion.

Further longitudinal studies should be performed to follow up the relationship between breast-feeding time and the development of NNS habits.

New studies are needed on fetal digit-sucking and tongue habits during gestation.

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