



## Consequences of bottle-feeding to the oral facial development of initially breastfed children

Karina Camillo Carrascoza,<sup>1</sup> Rosana de Fátima Possobon,<sup>2</sup>  
Laura Mendes Tomita,<sup>3</sup> Antônio Bento Alves de Moraes<sup>4</sup>

### Abstract

**Objective:** To identify and assess the possible consequences of bottle-feeding on the oral facial development of children who were breastfed up to at least six months of age.

**Method:** Two hundred and two children (4 years of age) enrolled in an early health attention program participated in the study. The sample was divided into two groups: G1 (children who used only a cup to drink) and G2 (those who used a bottle).

**Results:** Lip closure was observed in 82% of the children in G1 and in 65% of those in G2 ( $p = 0.0065$ ). The tongue coming to rest in the maxillary arch was found in 73% of the children in G1 and in 47% of those in G2 ( $p = 0.0001$ ). Nasal breathing was observed in 69% of G1 and in 37% of G2 ( $p = 0.0001$ ). The maxilla was shown to be normal in 90% of G1 and in 78% of G2 ( $p = 0.0206$ ).

**Conclusion:** Use of the bottle, even among breastfed children interferes negatively with oral facial development.

*J Pediatr (Rio J). 2006;82(5):395-7: Bottle feeding, breastfeeding.*

### Introduction

Breastfeeding is a determining factor for adequate craniofacial development, because it promotes intense exercise of the orofacial muscles, thus favorably stimulating the functions of breathing, swallowing, chewing and phonation.<sup>1</sup> The nipple-squeezing movements favor adequate lip closure during rest<sup>2</sup> and the correction of physiological mandibular retrognathism. In addition, these movements promote correct tongue positioning in the central incisor palatine region, due to the tonicity acquired with the intense activity of tongue muscles.<sup>3</sup>

In spite of the measures to promote breastfeeding carried out in baby friendly hospitals<sup>4</sup> and the legal discouragement of bottle feeding in Brazil,<sup>5</sup> there is evidence that there are two critical times for introducing the bottle: soon after birth and around four months of age.<sup>6</sup> The first situation occurs as a result of problems associated with breastfeeding that make it difficult for the child to gain weight. In this case, it is common for health professionals to prescribe infant formulas, generally offered in the bottle, to supplement/replace the mother's milk – although the correct measure would be to investigate the difficulties presented by the nursing mother and offer guidance about breastfeeding management.<sup>7</sup>

Introduction of the bottle to the child's feeding routine around the fourth month of life is probably related to the end of the mother's maternity leave in Brazil and her return to work. This is a moment characterized by many conflicts, such as the choice of a caretaker for the baby and the form of feeding in the absence of the mother.<sup>8</sup> Mothers who choose to leave their child in institutions (daycare centers/schools), where the use of the bottle is generally established, cannot demand the use of cups. The

1. Doutoranda em Saúde da Criança e do Adolescente, Faculdade de Ciências Médicas, Universidade Estadual de Campinas (UNICAMP), Campinas, SP, Brasil.

2. Professora Doutora, Faculdade de Odontologia de Piracicaba, UNICAMP, Piracicaba, SP, Brasil.

3. Doutoranda em Odontologia, Faculdade de Odontologia de Piracicaba, UNICAMP, Piracicaba, SP, Brasil.

4. Doutor. Professor titular, Faculdade de Odontologia de Piracicaba, UNICAMP, Piracicaba, SP, Brasil.

Manuscript received Feb 02 2006, accepted for publication May 25 2006.

**Suggested citation:** Carrascoza KC, Possobon RF, Tomita LM, de Moraes AB. Consequences of bottle-feeding to the oral facial development of initially breastfed children. *J Pediatr (Rio J)*. 2006;82:395-7.

professionals in these institutions justify this practice by the small number of staff in relation to the number of children and the degree of difficulty associated with feeding small children with a cup.<sup>9</sup>

The literature is consistent in affirming that to use a bottle to the detriment of breastfeeding has consequences for the child's health.<sup>10</sup> There is no study, however, describing the effects of using a bottle on the oral facial development of children who were given a bottle while also being breastfed up to the sixth month of life.

This being so, the objective of this study was to identify and assess the possible consequences of the use of a feeding bottle on the oral facial development of children who were breastfed (either exclusively or not) up to at least 6 months of age.

## Methods

The participants were 202 children (age: 4 years) attending the Research and Dental Treatment Center for Special Patients (*Centro de Pesquisa e Atendimento Odontológico para Pacientes Especiais* – Cepae) at the Piracicaba Dentistry School, State University of Campinas (UNICAMP) in 2004. Cepae provides care to children from the prenatal period through to the fifth year of life. The pregnant mother participates in educational lectures, and after the birth the mother-child pair participates in the Group to Encourage Exclusive Breastfeeding, from which they receive support to maintain breastfeeding and avoid introducing the bottle/pacifier. At 3, 4 and 5 years of age, the children go through dental and speech assessment, one of the activities offered by Cepae.

Group 1 was composed of all the children participating in Cepae who used only a cup to ingest liquid foods up to 4 years of age (they never used a bottle) (n=101). In order for Group 2 to include the same number of children as G1, the sample was randomly selected from among the Cepae patients who used a bottle for at least 1 year. Thus it was not necessary to calculate the sample size.

The sample included children breastfed for a minimum of 6 months, while those who presented other sucking habits apart from the feeding bottle (pacifier/finger) were excluded. These criteria were meant to avoid the interference of these variables in the investigation of specific consequences of bottle use on oral facial development.

In the orthodontic and speech assessment, all the children were examined by a dentist and a speech therapist. Those professionals were previously trained by the researchers in order to standardize the exam, but were not informed of the study objectives. The following data were noted: (1) occlusion: anterior open bite (absence of contact between the maxillary and mandibular incisors during posterior tooth occlusion); posterior crossbite

(contact between the vestibular cusp tips of the maxillary posterior teeth and occlusal grooves of the mandibular posterior teeth); (2) muscle aspects: lip posture (presence/absence of contact between the upper and lower lips during rest); tongue resting place (between the arches, in the maxillary or mandibular arch); (3) articulation: dental phonemes /t/, /d/, /n/, /l/ and alveolar phonemes /s/ and /z/ (phonological mismatches were not considered, but rather phonetic changes, which result from impaired articulation); (4) breathing pattern: mouth breathing, nose breathing and mixed (predominantly nasal or predominantly oral); (5) Palate depth: normal or high arched palate; (6) maxillary arch shape: atresic or semicircular; (7) face: symmetry or asymmetry.

The statistical analyses were performed using the chi-square and exact Fisher tests (level of significance = 5%).

This study was approved by the Research Ethics Committee at the Piracicaba Dentistry School, UNICAMP (Protocol No. 084/2004).

## Results

Lip closure was observed in 65% of bottle users and in 82% of cup users ( $p = 0.0065$ ). With regard to the tongue resting place, among the children who used cups, 73% presented tongue resting in the maxillary arch (desirable). Among the children who used feeding bottles, 53% presented tongue resting in the mandibular arch or between the arches (a change from normality), revealing hypotonicity of tongue muscles ( $p < 0.0001$ ).

There was greater occurrence of nose breathing among children using cups (69%). Among those who used a bottle, 63% presented mouth or mixed breathing ( $p < 0.0001$ ). The shape of the maxillary arch was different in the two groups, maxillary atresia being present in 22% of the bottle users and in 10% of the cup users ( $p = 0.0206$ ). There was no difference between the groups in terms of malocclusion, articulation, palate depth and presence of facial asymmetry ( $p > 0.05$ ).

## Discussion

There was statistical difference between the groups as regards lip closure, which was predominant among cup users, showing the positive influence of the movements performed while sucking the mother's milk.<sup>2</sup> In addition to lip closure, the sucking movements associated with breastfeeding favor tongue positioning in the palatal region of the central incisors, since the intense activity of the tongue muscles promotes tonic<sup>3</sup> and prevents air from passing through the mouth, thus favoring the establishment and maintenance of nose breathing. This type of breathing not only heats, humidifies and filters the air before it reaches the lungs, but is considered the

functional matrix for maxilla growth. The passage of air through the nose exerts pressure on the palate, causing it to be lowered and to expand. This phenomenon enables the face bones to accompany body growth, generating space for the teeth to erupt adequately.<sup>11</sup>

When the bottle is used, the tongue acts only to control the milk outlet, and becomes hypotonic and incapable of remaining in the most adequate position.<sup>10</sup> This observation confirms the results of the present study as regards the greater occurrence of hypotonicity, resulting in the tongue resting in the incorrect place among bottle users. The absence of a function for the tongue, causing it to rest on the maxillary arch, allows air to enter through the mouth, thus compromising nose breathing.<sup>12</sup> Once again, the results of this study corroborated the findings reported in the literature, when it showed that over 60% of the children who used bottles presented mouth or mixed breathing.

The absence of air passing through the nose causes maxillary arch atresia.<sup>13</sup> This relation was also observed in our study, in which bottle users presented more maxillary atresia. The tongue resting in the mandibular arch may also act as a functional matrix for inadequate mandibular growth. This occurrence, associated with the passage of air through the nose, may lead to the development of posterior crossbite. An additional consequence is described by Köhler,<sup>14</sup> who states that the buccinator, the muscle responsible for obtaining milk from the bottle, becomes hypertrophic with prolonged suction, thus disproportionately aggravating maxilla/mandibular growth. This inadequate tonicity not only causes crossbite and dental crowding, but may lead to sequential alterations in the face, such as excessive narrowing of the maxilla, palate atresia and septal deviation, and compromise the esthetic appearance and function of the nose.

The results of the present study showed no statistical difference between the groups as regards occlusion. It is worth pointing out, however, that the children were examined at an age (36 months) in which they may still be too young to present posterior crossbite. This hypothesis is reinforced by the greater occurrence of the two factors that lead to posterior crossbite among bottle users: maxillary atresia and the tongue being positioned in the mandibular arch. Since the results of this study showed no

evidence of the direct relation between posterior crossbite and the use of feeding bottles, it is suggested that a study of older subjects be made.

Thus, the results of this study showed that the use of the feeding bottle, even among children who were breastfed, interferes negatively with oral facial development.

## References

- 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 Dent Press Ortod Ortop Facial*. 2001;6:111-21.
- Serra-Negra JMC, Pordeus IA, Rocha Jr JF. Estudo da associação entre aleitamento, hábitos bucais e maloclusões. *Rev Odontol Univ Sao Paulo*. 1997;11:79-86.
- Neiva FC, Cattoni DM, Ramos JL, Issler H. Desmame precoce: implicações para o desenvolvimento motor-oral. *J Pediatr (Rio J)*. 2003;79:7-12.
- Vannuchi MTO, Monteiro CA, Rea MF, Andrade SM, Matsuo T. Iniciativa Hospital Amigo da Criança e aleitamento materno em unidade de neonatologia. *Rev Saude Publica*. 2004;38:422-8.
- Norma brasileira para comercialização de alimentos para lactentes. International baby food action network. Resoluções da Diretoria Colegiada/ANVISA. 2002. <http://www.ibfan.org.br/rdc222.htm>. Access: 23/06/2006.
- Oliveira RL, Silva AN. Aspectos legais do aleitamento materno: cumprimento da lei por hospitais de médio e de grande porte de Maceió. *Rev Bras Saude Matern Infant*. 2003;3:43-8.
- Rea MF. Reflexões sobre a amamentação no Brasil: de como passamos a 10 meses de duração. *Cad Saude Publica*. 2003;19: S37-S45.
- Lamounier JA. O efeito de bicos e chupetas no aleitamento materno. *J Pediatr (Rio J)*. 2003;79:284-6.
- Dowling DA, Meier PP, DiFiori JM, Blatz MA, Martin RJ. Cup-feeding for preterm infants: mechanics and safety. *J Hum Lact*. 2002;18:13-20.
- Jorge MD. Hábitos bucais - Interação entre odontopediatria e fonoaudiologia. *J Bras Odontop Odont Bebe*. 2002;5:342-50.
- Legovic M, Ostric L. The effects of feeding methods on the growth of the jaws in infants. *ASDCJ Dent Child*. 1991;58:253-5.
- Ferreira MIDT, Toledo OA. Relação entre tempo de aleitamento materno e hábitos bucais. *Rev ABO Nac*. 1997;5:317-20.
- Fagundes ALA, Leite ICG. Amamentação e maloclusão: revisão de literatura. *J Bras de Fonoaudiologia*. 2001;2:229-32.
- Köhler NRW. Distúrbios miofuncionais: considerações sobre seus fatores etiológicos e conseqüências sobre o processo de crescimento/desenvolvimento da face. *Rev Dent Press Ortod Ortop Facial*. 2000;5:66-79.

## Correspondence:

Karina Camillo Carrascoza  
Avenida Limeira, 901, Bairro Areião  
CEP 13414-903 – Piracicaba, SP – Brazil  
Tel.: +55 (19) 3412.5363  
Fax: +55 (19) 3412.5218  
E-mail: carrascoza@fop.unicamp.br