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DO BREAST AND BOTTLE FEEDING INFLUENCE OCCLUSAL PARAMETERS?

Galán-González, Antonio; Odontology School, Stomatology
Dominguez-Reyes, Antonia; Dentistry School, Stomatology
Aznar-Martín, Teresa; Odontology School, Stomatology
Cabrera-Domínguez, María; Odontology School, Stomatology

ABSTRACT

Objective: A study was made of the influence of breast and bottle feeding upon development of the dental arches and occlusion in an infant population.

Material and method: A total of 298 infants (163 girls and 135 boys) were selected from series of 1643 preschool children in Seville (Spain), evaluating the type of feeding received after birth (breastfeeding only, or bottle feeding only), the duration of such feeding, and its influence upon the parameters that define occlusion of the dental arches. The study comprised a full exploration of the stomatognathic system of the infants, and a questionnaire for the parents. The SPSS statistical package was used to analyze the results.

Results: A total of 109 children were exclusively breastfed (36.6%) for an average of 6.8 ± 5.8 months, while 189 children were exclusively bottle fed (63.4%) for an average of 17.99 ± 11.5 months. On comparing the occlusal parameters of the two groups, the most beneficial effects (straight terminal plane, canine class I relationship, diastemas and primate spaces) corresponded to the infants who were breastfed.

Conclusions: Breastfed infants show better development of the dental arches and a lesser incidence of dental occlusion disorders than bottle fed infants.

Key words: Breastfeeding, bottle feeding, preschool children, dental occlusion, malocclusion, primary dentition.

INTRODUCTION

Breastfeeding is essential for the correct nutritional, emotional and immunological development of the infant. Different authors have reported that infants who are not breastfed are at an increased risk of suffering otitis media, gastroenteritis, airway infections, obesity, diabetes, leukemia, sudden death and necrotizing enterocolitis (1-3). Other studies describe an increased frequency of non-feeding suction habits (dummy, thumb sucking) in children that have been regularly bottle fed (4-6), though a review of the literature has yielded no studies that analyze and compare the influence of exclusive breast or bottle feeding upon dental occlusion in infants without these habits. According to some investigators, breastfeeding prevents the development of bad habits, while bottle feeding is cited as one of the causes of malocclusion (7). Regarding the stomatognathic system, different authors indicate that prolonged breastfeeding favors correct development and positioning of the dental arches – this being essential for ensuring ideal occlusion (8,9). In contrast, such optimum development does not appear to occur in bottle fed infants (10).

Other authors indicate that breastfeeding could be associated with fewer occlusal

anomalies (11,12), since it favors correct growth of the upper maxilla and the dental arches. This is not the case in bottle fed infants, since the orofacial muscles that intervene in the two feeding modalities differ (13). However, it should be remembered that the development of the craniofacial complex (mandible, dental arches, tongue, facial muscles) is not only dependent upon environmental factors but is also influenced by genetic factors and their interactions (9,14-16).

Since occlusal development is conditioned by a range of factors, it is not easy to evaluate the influence of isolated factors. Most studies center on the effects of non-feeding suction habits (dummy, thumb sucking) upon the temporal dentition (17-19) and their relation to certain malocclusions such as open bite, overjet or crossbite (20,17), but they do not separately relate breast or bottle feeding to the parameters that define correct occlusion. With the purpose of exploring and comparing the direct impact of the two feeding modalities upon these parameters, we have carried out a study in preschool children in Seville (Spain) - eliminating those additional factors that may influence the results, such as the aforementioned non-feeding suction habits.

We believe correct occlusion of the temporal dentition to be essential for preventing and reducing occlusal problems in the permanent dentition. In this context, we consider it the responsibility of healthcare professionals to underscore the importance of breastfeeding for correct dental arch positioning and dental occlusion – thereby contributing to improve patient quality of life and lessen the costs associated with the treatment of malocclusions.

MATERIAL AND METHODS

The study selected a total of 1643 preschool children in 18 nurseries pertaining to 6 municipal health districts in the metropolitan area of Seville (Spain), representative of the different socioeconomic levels (lower, middle, upper).

The following inclusion criteria were used: Exclusive breast or bottle feeding (infants with mixed breast and bottle feeding were excluded). No bad oral habits (dummy, thumb sucking). Age from 3 to 6 years (temporal dentition). Enrollment in the nurseries included in the study. Parents have given in the patient questionnaire. Absence of oral or systemic conditions capable of influencing the results.

Of the total sample, 298 preschool children (18.14%) satisfied all these criteria.

The study made use of the material commonly employed for oral and dental exploration, and an analysis was made of the occlusal parameters in the three spatial planes, the existence of interdental spaces, and the presence of crowding.

In the anteroposterior plane of the dental arches we analyzed the following:

Canine relationship or the form of occlusion of the upper and lower canines. Three forms of occlusion were considered: class I in the case of correct occlusion; class II when the upper canines were advanced with respect to the lower canines; and class III when the lower

canines were advanced with respect to the upper canines.

Terminal plane or the form of occlusion of the temporal second molars: straight terminal plane; mesial step (the upper molar lies anterior to the lower molar); or distal step (the lower molar lies anterior to the upper molar).

Overjet or the separation of the upper and lower incisors in the anteroposterior plane.

In the transversal plane we analyzed the following: Posterior crossbite, this is, the external cuspids (vestibular) of the upper premolars and molars occlude internal to the fossae of the lower premolars and molars. These crossbites can affect the two upper hemiarches (bilateral posterior crossbite), a single hemiarch (right or left unilateral posterior crossbite), and even one or several teeth.

In the sagittal plane we analyzed the following: Open bite, i.e., in the vertical plane there is a lack of contact of one or more teeth of an arch with the corresponding antagonists; and overbite, i.e., the upper incisors completely cover the lower incisors.

The presence or absence of interdental spaces in the arches was assessed according to the following: Interincisal diastemas (separation between the temporal incisors). Primate spaces (physiological spaces between the lateral incisors and the upper canines, and between the canines and the lower first molars). And dental crowding.

The parents in turn received a questionnaire addressing the type of feeding the infant had received (breast milk or bottle), whether feeding was of one type only or mixed (alternated), the time for which each feeding modality had been used, and whether the child presented bad oral habits.

The SPSS statistical package was used for the analysis of the results. A full descriptive analysis was made, comprising the following variables:

- Gender
- Age
- Breast or bottle feeding and its duration, based on the following categories:
 - Only breastfeeding or only bottle feeding.
 - The duration of feeding was divided into three groups: only breastfeeding or only bottle feeding up until 6 months of age; between 6 and 18 months of age; and over 18 months of age.
- The oral repercussions of breast or bottle feeding were analyzed based on a series of dental parameters:
 - Terminal plane
 - Canine occlusion
 - Incisor occlusion
 - Crossbite (right, left and bilateral)

- Diastemas (anterior and posterior)
- Primate spaces
- Crowding (anterior and posterior)

There were no significant gender or age differences among the different groups. Comparisons were made based on the chi-squared test in the case of qualitative variables and using analysis of variance (ANOVA) in the case of quantitative variables exhibiting a normal distribution, while the Kruskal-Wallis test was used in the presence of a non-normal distribution. In all cases a 95% confidence level was accepted.

RESULTS

Of the 1643 preschool children initially subjected to screening, 298 (163 girls and 135 boys) met all the study inclusion criteria. The age distribution was as follows: 12 patients aged 3 years, 103 aged 4 years, 158 aged 5 years, and 25 children aged 6 years. Regarding the type of feeding, 109 children (36.6%)(53 girls and 56 boys) received only breastfeeding, while 189 children (63.4%)(110 girls and 79 boys) received only bottle feeding.

In relation to the duration of breastfeeding, over one-half of the children were breastfed for a maximum of 6 months (Fig. 1). In contrast, most of the bottle fed infants received this type of feeding for between 6 and 18 months (Fig. 2).

Since our aim was to explore the oral repercussions of breast and bottle feeding, we crossed the occlusal parameters obtained at exploration with the feeding variables of the patients. In this context, a statistically significant relationship was observed between the type of feeding and the terminal plane – a larger percentage of straight terminal planes (favorable for occlusion) being recorded in the breastfeeding group, with a larger percentage of distal terminal planes (pathological) among the infants who were only bottle fed (Fig. 3). However, on considering the time factor referred to each feeding modality, a statistically significant correlation was observed with the duration of bottle feeding but not with the duration of breastfeeding (Fig.s 4 and 5).

Although statistical significance was not reached, the infants who were breastfed showed a higher incidence of canine class I relationship, which is optimum for dental occlusion (observed in 88.1% of the breastfed infants and in 81.5% of those who were bottle fed only). In contrast, bottle feeding was associated with an increased probability of canine class II relationship, which is pathological (observed in 16.4% of the bottle fed infants versus in 10.1% of the breastfed patients). However, the incidence of canine class III did not appear to be influenced by either breast or bottle feeding. Likewise, we found no significant differences in canine relationships on considering the duration of either breast or bottle feeding.

Again, although statistical significance was not reached, diastemas and primate spaces were seen to be more frequent among the breastfed infants than in those who received bottle feeding – this observation being favorable for correct occlusion. In effect, 36.1% of the breastfed infants had diastemas in both the upper and the lower arch, versus 31.2% of those who received bottle feeding, while upper and lower primate spaces were recorded in 43.1% and 37.6% of the cases, respectively.

Dental crowding in turn was seen to be less common among the children who were breastfed than in those who received bottle feeding. On the other hand, and in the same way as in the case of the interincisal diastemas and primate spaces, no significant differences in crowding were noted on also considering the time factor, i.e., the duration of each feeding modality.

A significantly higher frequency of anterior open bite was recorded in the bottle fed children. Likewise, and although statistically significant differences were not observed, the magnitude of overjet was greater among the infants that had received bottle feeding for the longest period of time.

Lastly, as regards the occlusal parameters, we found no significant relationship between the duration of bottle feeding and posterior crossbite.

DISCUSSION

Although all the main medical organizations advocate exclusive breastfeeding during the first 6 months of life (21-23), its prevalence and duration in Europe falls short of the World Health Organization (WHO) recommendations. Nevertheless, between 1996-2006, the prevalence of exclusive breastfeeding during the first 6 months increased significantly in Europe, from 10% to 19% (24).

According to the latest data (corresponding to 1997) of the Nursing Committee of the Spanish Association of Pediatrics, the average duration of breastfeeding is 3.2 months (25,26).

However, the latest Spanish national health survey, conducted in 2006, found the percentage of women starting exclusive breastfeeding to be 68.4%, though only 24.7% maintained breastfeeding for 6 months (27). In our series, 36.6% of the preschool children received breastfeeding, and of these, 43.1% were breastfed for more than 6 months. This indicates that the campaigns launched by different organisms in favor of breastfeeding are proving successful, at least in our setting (28), though in our study 63.4% of the infants continued to receive bottle feeding, and 15.9% of these infants maintained this feeding modality for over 24 months.

As has been mentioned, breastfeeding is of great importance for correct development of the stomatognathic system. Proffit (8) described the great mandibular effort infants must make during the lactation period, and underscored that this favors both nasal breathing and harmonious development of the dental arches. In turn, Legôvic and Ostrîc (9) described how breastfeeding can condition the growth and development of the maxillofacial region.

All these aspects have been observed in our study, though corroborated by measurements of different occlusal parameters. Thus, we found a higher incidence of canine class I relationships in exclusively breastfed infants, and a greater incidence of class II occlusions in those who had only received bottle feeding.

In coincidence with the observations of Lescano and Varela (29), our study recorded a higher

frequency of interincisal diastemas and primate spaces in the breastfeeding infants, and a greater incidence of dental crowding in those who were bottle fed.

Some authors such as Humphreys and Leighton (30) have reported no deleterious effects of bottle feeding upon dental occlusion. However, a great majority of investigators, including Hanna (31), Harvold (32), Van der Linden (33), Hunt (34), and Moss and Picton (35), consider that bottle feeding for more than 18 months can cause occlusal disorders. A pioneering study in this sense was published by Hellman (36), who suggested an association between bottle feeding and the appearance of certain malocclusions.

We observed a statistically significant relationship between bottle feeding and certain occlusal alterations, such as an increased frequency of distal step occlusion, or canine class II relationships. This explains why authors such as Warren (19) recommend suspending bottle feeding at an early age.

Although we observed no statistically significant increase in overjet in these preschool children, as described by other authors (30,31,32), in the sector anterior we noted a significant relation to open bite, likewise mentioned by the above authors, and more recently by Romero (37) – though these studies addressed not only feeding modality but also non-feeding habits.

CONCLUSIONS

Our study of the occlusal implications of exclusive breast or bottle feeding, independently of other bad non-feeding habits, found the parameters leading to correct occlusion (canine class I, interincisal diastemas, primate spaces, lesser dental crowding) to be more prevalent in infants that are breastfed - statistically significant relationship being observed in the case of the straight terminal plane.

In contrast, infants that are exclusively bottle fed show a significantly increased presence of terminal planes with distal step occlusion, canine class II relationships, anterior open bite and crowding – these being parameters that do not favor correct occlusion.

In view of the results obtained, we consider breastfeeding for at least 6 months to favor correct occlusion in the temporal dentition, which in turn facilitates normal occlusion in the permanent dentition.

All the authors have cooperated in the same way to the development of the present study.

REFERENCES

1.- Ladomenou F, Moschandreas J, Kafatos A, et al. Protective effect of exclusive breastfeeding against infections during infancy: A prospective study. *Arc Dis Child* 2010; 95 :1004-1008.

- 2.- Mcneil ME, Labbok MH, Abrahams SW. What are the risks associated with formula feeding? A re-analysis and review. *Birth* 2010; 37: 50-58.
- 3.- Kramer MS, Kakuma R. The optimal duration of exclusive breastfeeding: a systematic review. *Adv Exp Med Biol.* 2004; 554:63-77.
- 4.- Charchut SW, Allred EN, Needleman HL. The effects of infant feeding patterns on the occlusion of the primary dentition. *J Dent Child* 2003 Sep-Dec; 70(3):197-203.
- 5.-Victoria CG, Behague DP, Barros FC et al. Pacifier use and short breast-feeding duration: Cause, consequence, or coincidence?. *Pediatrics* 1997; 99:445-453.
- 6.- Montaldo L, Montaldo P, Cuccaro P, et al. Effects of feeding on non-nutritive sucking habits and implications on occlusion in mixed dentition. *Int J Paediatr Dent.* 2011 Jan; 21(1):68-73.
- 7.- Larsson E. Breast-feeding, suckling and the sucking urge: their development and their influence on the developing dentition. Bishara S, ed. *Monograph Tryckeriet. Mariestad, Sweden: Regionens Hus,1999.*
- 8.- Proffit WR. Fases iniciales del desarrollo. *Ortodoncia: Teoría y Práctica*, Proffit WR. Ed Mosby Doyma, Madrid. 1994;56-86.
- 9.- Legôvic M, Ostic L. The effects of feeding methods on the growth of the jaws in infants. *J Dent Child* June 1991; 253-255.
- 10.- Straub WJ. The etiology of perverted swallow habit. *Am J Orthod* 1960; 47:603-610.
- 11.- Palmer B. The influence of breastfeeding on the development of the oral cavity: a commentary. *J Hum Lact* 1998; 14:93-98.
- 12.- Labbok MH, Hendershot GE. Does breast-feeding protect against malocclusion? An analysis of the 1981 child health supplement to the national health interview survey. *Am J Pre Med* 1987; 3:227-232.
- 13.- Turgeon-O'Brien H, Lachapelle D, Gagnon PF, et al. Nutritive and nonnutritive sucking habits: A review. *J Dent Child* 1996; 63(5):321-326.
- 14.- Enlow DH, Bang S. Growth and remodelling of human maxilla. *Am J Orthod* 1965; 51: 446-464.
- 15.- Moss ML. The primary rule of functional matrices in facial growth. *Am J Orthod Dentofacial Orthod.*1969; 55:20-3.
- 16.- Sange R, Bystrom E. Breastfeeding: Does it effect oral facial growth? *Dent Hyg.*1982; 56:44-47.

- 17.-Larsson E. Sucking, chewing, and feeding habits and the development of crossbite: a longitudinal study of girls from birth to 3 years of age. *Angle Orthodontist*. 2001; 71(2):116-119.
- 18.-Peres KG, Barros FC, Peres MA, Victoria CG. Effects of breastfeeding and sucking habits on malocclusion in a birth cohort study. *Rev Saude Publica* 2007; 41(3):343-350.
- 19.- Warren J, Bishara S. Duration of nutritive and non-nutritive sucking behaviours and their effects on the dental arches in the primary dentition. *Am J Orthod Dentofacial Orthop* 2002; 121:347-356.
- 20.- Viggiano D, Fassano D, Monaco G, et al. Breast feeding, bottle feeding, and non-nutritive sucking; effects on occlusion in deciduous dentition. *Arch Dis Child*. 2004; 89(12):1121-1123.
- 21.- Gartner LM, Morton J, Lawrence RA, et al. Breastfeeding and the use of human milk. *Pediatrics*.2005; 115:496-506
- 22.- American College Of Obstetrics and Gynecology. Special Report from ACOG. Breastfeeding: Maternal and infant aspects .*ACOG Clin Rev* 2007; 12(1(suppl)):1S-16S.
- 23.- World Health Organization. Report of the Expert Consultation of the Optimal Duration of Exclusive Breastfeeding. World Health Organization, Geneva, 2001.
- 24.- .-World Health Organization. Infant and young child feeding model chapter for texts books for medical students and allied health professionals. URL:<http://www.who.int/nutrition/publications/infantfeeding/9789241597494/en/index.html> (accessed december 12, 2012).
- 25.-Comité de Lactancia Materna de la Asociación Española de Pediatría. Informe técnico sobre la lactancia materna en España. *An Esp Pediatr* 1999; 50(4):333-340
- 26.-Hernández Aguilar MT , Maldonado, J Aguayo. La lactancia Materna. Como promover y apoyar la lactancia Materna en la Práctica pediátrica. Recomendaciones del Comité de Lactancia de la AEP. *An Pediatr*. 2005; 63 (4):340-356
- 27.-Ministerio de Sanidad y Consumo. Encuesta Nacional de Salud 2006. Estadísticas Sanitarias. URL:<http://www.msc.es/estadEstudios/estadisticas/encuestaNacional/encuestaIndice2006.html> (accessed: december 12, 2012).
- 28.- Bhandari N, Kabir A.K.M.I Salam M.A. Mainstreaming nutrition into maternal and child health programmes: scaling up of exclusive breastfeeding. *Maternal and Child Nutrition*.2008 4:5-23
- 29.-Lescano A, Varela T. Tipo y duración de la lactancia y sus consecuencias oclusales. *Rev*

Iberoam Ortod 2000; 19(1):21-28

30.-Humphreys HF, Leighton BC. A survey of antero-posterior abnormalities of the jaws in children between the ages of two and five and half years of age. Br Dent J 1950; 88:3-15.

31. Hanna JC. Breastfeeding versus bottlefeeding in relation to oral habits. J Dent Child 1967; 34:243-294.

32.- Harvold EP, Chierici G, Vargervic K. Experiments on the development of dental malocclusion. Am J Orthod 1972; 61:38-46.

33.-Van Der Linden FP. Genetic and environmental factors in dentofacial morphology. Am J Orthod 1966; 52:576-583.

34.- Hunt EE. Malocclusion and civilization. Am J Orthod 1961; 47:406-422.

35.- Moss JP, Picton DC. The problems of dental development among the children on a Greek island. Dent Pract 1968; 18:442-448.

36.- Hellman M. A study of some etiological factors of malocclusion. Dent Cosmos 1914; 56:1017-1031.

37.- Romero CC, Scavone-Junior H, Garib DG, et al. Breastfeeding and non-nutritive sucking patterns related to the prevalence of anterior open bite in primary dentition. J Appl Oral Sci. 2011 Apr;19(2):161-8.