

[\[Print Version\]](#)

[\[PubMed Citation\]](#) [\[Related Articles in PubMed\]](#)

TABLE OF CONTENTS

[\[INTRODUCTION\]](#) [\[MATERIALS AND...\]](#) [\[RESULTS\]](#) [\[DISCUSSION\]](#) [\[CONCLUSIONS\]](#) [\[REFERENCES\]](#)

The Angle Orthodontist: Vol. 71, No. 2, pp. 116–119.

Sucking, Chewing, and Feeding Habits and the Development of Crossbite: A Longitudinal Study of Girls From Birth to 3 Years of Age

Erik Larsson Odont, Dr^a

ABSTRACT

The prevalence of posterior crossbite among pacifier-sucking girls in Falköping, Sweden, was previously found to be 26%. The aim of this investigation was to follow the development of crossbites in pacifier suckers and to determinate the possibility of reducing the prevalence of crossbite by informing and instructing the parents about sucking habits and reducing the time the child has the pacifier in the mouth. Parents of 60 consecutively born girls belonging to St Olof's health district, Falköping, Sweden, were invited to take part in the study. All parents agreed to participate. Five interviews or examinations of each girl took place from birth until 3 years of age. Fifty-four (90%) of the 60 girls were breast-fed. The mean duration of breast-feeding was 8 months, and 67% of the girls were breast-fed for half a year or more. Forty-three children (72%) developed a pacifier-sucking habit, 6 (10%), a digit-sucking habit, and 11 (18%), no sucking habits. The mean duration of breast-feeding was longer for the nonsuckers (11 months) than for the pacifier- and digit-sucking children (5 months). Of the 39 girls who still had the pacifier habit at 3 years of age, 2 had developed a posterior crossbite. Another girl stopped the habit when a crossbite was registered at the 2^{1/2}-year examination. At the next appointment, the crossbite had corrected itself spontaneously. One of the 2 girls with crossbite at 3 years of age developed a prenatal occlusion with both anterior and posterior crossbites. For 12 more pacifier suckers, an interfering contact was noted with a forced guidance of the mandible and a midline shift. In all 12 cases, the interfering teeth were primary canines. We conclude that parents should be instructed to reduce the "in the mouth time" of the pacifier. The transverse occlusal relationship in pacifier-sucking children should be evaluated between 2 and 3 years of age. If interfering contacts of the primary canines exist, the parents should be instructed to reduce the pacifier-sucking time.

KEY WORDS: Digit sucking, Pacifier sucking, Breast-feeding, Crossbite, Teething.

Accepted: October 2000.

INTRODUCTION [Return to TOC](#)

Ogaard et al⁵ have studied this relationship in children from Falköping, Sweden. Their studies indicated that the tendency to develop a posterior crossbite in the primary dentition is higher for pacifier suckers than for digit suckers, higher for Falköping children than for children from Norway, higher for girls than for boys, and that the prevalence is increasing. A later study on 3-year-old pacifier-sucking Falköping girls showed a prevalence of posterior crossbites of 26%. Previously^{5,6} it has been suggested that, when the teat of the pacifier is kept in the mouth, the tongue will be forced to a lower position in the anterior part of the mouth, thereby reducing the palatal support of the upper primary canines and molars against the pressure of the cheeks. The tongue will exert increased lateral pressure on the lower canines and first molars. The lack of palatal support from the tongue will result in a narrower upper arch, and the pressure of the tongue will widen the lower arch. These changes act synergistically to create a transverse disharmony that will increase the tendency for a posterior crossbite to develop.

According to Proffit,⁷ pressure against the teeth has to exist for at least 6 h/d to result in tooth movement. Differences in the number of hours per day that children spend with the pacifier in the mouth, in addition to the sucking intensity, could probably explain why some children develop a posterior crossbite and others do not.⁸

The aim of the present investigation was to follow longitudinally the development of the crossbite and to determine whether it is possible to reduce the prevalence of posterior crossbite in pacifier-sucking young Falköping girls. The interceptive approach consists of informing the parents about the etiology and the effects of artificial sucking habits and to recommend a reduction in the time the child has the pacifier in the mouth. Variables concerning feeding, chewing, and teething were recorded at different time intervals.

MATERIALS AND METHODS [Return to TOC](#)

Parents of all girls born in a district in Falköping, Sweden, between June 1995 and September 1997 were invited to participate in the present study. It was emphasized that participation in the study was voluntary. The author and an orthodontic assistant carried out the first interview when the child was between 1 and 5 months of age. The interview took place at the local health center in conjunction with a routine health evaluation of the child. Normally there were 4 further interviews and, when possible, intraoral inspections until the girls were 3 years old. These interviews and evaluations were mainly performed at the orthodontic clinic by 1 of 2 orthodontic assistants and an orthodontist.

During the 3-year observation time, the parents were given the opportunity to listen to a lecture in which the orthodontist discussed the etiology of digit- and pacifier-sucking and their effect on the occlusion. Also the orthodontic assistants, at their meetings with the parents, recommended a reduction in the time the child had the pacifier in the mouth and to encourage the child to chew by giving her more hard chewing food. During the interview, the variables evaluated included the following:

1. Breast-feeding and feeding, duration, and frequency.
2. Chewing resistance of the food.
3. Sucking habits, duration, intensity, and changes in intensity.
4. Biting and chewing habits.
5. Crossbites, functional interferences, and midline shifts.
6. Problems in connection with teething.
7. Design and material of the teat.

In many cases it was not possible to thoroughly inspect the girls intraorally until the last visit at 3 years of age.

RESULTS [Return to TOC](#)

All parents agreed to participate in the study. Nine of the initial 60 children were omitted from the last part of the study because of lack of time to come for the evaluation or because they had moved out of the area.

Feeding

Fifty-four (90%) of the 60 girls were breast-fed. The mean duration of breast-feeding was 8 months, and 67% of the girls were breast-fed for half a year or more. The average girl was breast-fed for half a year. Bottle feeding started successively after a few months. Purées of potatoes and other root crops were introduced at half a year of age, and ordinary food was begun shortly before 1 year. Most children used the bottle for 1 or 2 meals a day until at least 2 years of age.

Artificial sucking habits

Of the total group, 43 children (72%) developed a pacifier-sucking habit, 6 (10%), a digit-sucking habit, and 11 (18%), no sucking habits. Student's *t*-test comparisons indicated that the mean duration of breast-feeding was significantly ($P < .01$) longer for the nonsuckers (11 months) than for the pacifier- and digit-sucking children (5 months). Four children were partly breast-fed for more than $1\frac{1}{2}$ years. One of these was still suckling several times a day at the last examination at 3 years of age. Three of these 4 girls did not develop an artificial sucking habit. For 12 of the children with an artificial sucking habit, the parents had reported an increase in the sucking urge at about $1\frac{1}{2}$ years of age.

Artificial sucking habits and the development of crossbite

Two of the 6 digit-sucking girls stopped the habit before 3 years of age. One of the 3-year-old digit suckers had developed a crossbite and a prenatal occlusion. Of 43 pacifier-sucking girls, 4 had stopped the habit before 3 years of age. Three children had developed a posterior crossbite. However, 1 of these girls stopped the habit when the crossbite was registered at the $2\frac{1}{2}$ -year visit. At the next appointment, the crossbite had corrected itself spontaneously. One of the 3 girls was developing a prenatal occlusion with both anterior and posterior crossbites. For 12 more pacifier suckers, an interfering contact was noted, accompanied with a forced guidance of the mandible and a midline shift. In all 12 cases, the interfering teeth were the primary canines. At 3 years of age, no transverse deviations were registered for the previous pacifier suckers.

The pacifier

Pacifiers with silicon teats were not especially popular. Only 1 child preferred these to the latex ones. One mother reported that her daughter used a silicon pacifier to chew on. Pacifiers with flat teats were equally accepted as those with round ones.

The children seemed to prefer the type of pacifier that they initially used. However, changing from a smaller type of pacifier to a larger one of the same design when growing older seemed to cause little problem.

Biting habits

The desire to suck, bite, and gnaw at everything was high in most of the children. Bite rings, although frequently purchased, were not especially popular. The girls preferred to use toys and other objects.

Teething

For 26 girls the parents reported considerable problems during tooth eruption, whereas the other 34 had mild to moderate discomfort. The mothers reported an increased dribble and biting or gnawing activity, especially around the eruption area. The upper incisors and, more often, the molars caused considerable irritation and pain. Several parents associated teething with diarrhea and even fever.

DISCUSSION [Return to TOC](#)

The prevalence of artificial sucking habits, bottle feeding, and the introduction of grown-up food, as well as problems with teething, was similar to what has been reported in earlier studies.^{9,10} The observation that teething for many children was associated with mild to moderate problems corresponds well with findings reported by Macknin et al.¹¹ Despite the recommendation to introduce hard chewing food, bottle feeding in Sweden is prolonged compared with Norway.¹⁰

Breast-feeding

The present study was longitudinal and prospective in evaluating feeding, duration, and intensity of sucking and biting habits and teething. Compared with previous investigations about feeding and sucking habits in the same area in Sweden, the present figures show a large increase in the prevalence of breast-feeding. In this study, most children (90%) initially breast-fed. The average breast-feeding time was 8 months, and 4 of the 60 girls were still breast-fed at $1\frac{1}{2}$ years. In addition, 67% of the children were still breast-fed at 6 months, compared with only 4% in 1971.⁴ The mean breast-feeding time had increased when compared with children born in 1988 in the same geographical area, who were breast-fed for an average 5.8 months.¹⁰

Breast-feeding and the development of the artificial sucking habit

Very few studies have shown any negative correlation between breast-feeding and artificial sucking habits.¹²⁻¹⁵ Actually, the reverse has recently been shown in an American study.¹⁶ In a 1971 study,⁴ children who were breast-fed for more than half a year developed an

artificial sucking habit significantly less often than other children. In the present study, the girls with an artificial sucking habit were breast-fed for a significantly shorter time than those who did not. Of 4 children who were breast-fed more than $1\frac{1}{2}$ years, only 1 developed an artificial sucking habit.

It is interesting to note that traditionally living people, such as the Kung-Sans,¹⁷⁻¹⁹ as well as the Guananda and the Mole-Dagbani in Africa,²⁰ the Chiapas in Mexico,²¹ and the Amele in Papua New Guinea,²² breast-feed their children intensively for about 3–4 years. The baby sleeps with the mother during its first years, normally until the next pregnancy. The child suckles several times during the night, often without waking the mother. According to Konnor and Worthman, the Kung-Sans breast-feed on average every 13 minutes.¹⁹

Several other researchers have made similar observations. Gray,^{23,24} for instance, has studied breast-feeding practices among nomadic Turkana pastoralists in Kenya. She noted that the Turkana infants suckled frequently for extended periods of 1–2 hours of on-demand breast-feeding activity. These periods were separated by at least 45 minutes. During the sucking periods, children were breast-fed whenever they demanded the nipple. Over a 24-hour period, there was an average of 8 of those prolonged periods. During each period of breast-feeding, the total minutes of suckling ranged from 12 to 35 minutes. Breast-feeding activity occurred in 84% of a total 222 hours of breast-feeding observations. It is easy to postulate that children who are suckling so frequently have neither the time nor the need for additional artificial sucking.

In an earlier publication,⁸ it was concluded that unrestricted breast-feeding for the first 2–3 years of life eliminated the need to develop an artificial sucking habit. The present study indicated that this relation might still exist today.

Surprisingly, Gray^{23,24} reported that the sucking intensity actually increased when the child grew older. At 19 months of age, the children suckled for an average of 11.4 min/h, which was 3 minutes longer than at 8 months of age. Many parents in this study have noted that the sucking urge seems to increase after $1\frac{1}{2}$ years of age.

Artificial sucking habits and the development of a crossbite

Two (5%) out of 39 girls who were still pacifier suckers at 3 years of age had developed a posterior crossbite. One of the 2 girls was developing a prenatal occlusion, which might be the reason for the posterior crossbite rather than the pacifier sucking. In this study, there was a significant reduction in the prevalence of crossbite compared with the 26% incidence among comparable girls born about 10 years earlier. Furthermore, 1 girl had succeeded in eliminating an earlier crossbite by giving up the sucking habit. These results suggest that it is possible to reduce the risk of developing a crossbite in pacifier suckers by asking the parents to reduce the time the pacifier is in the child's mouth. The evaluation of the cases also indicated that in some instances a spontaneous improvement could take place if the sucking habits stop.

The findings from the present study suggest that parents should be instructed to reduce the "in the mouth time" of the pacifier. One idea is to let the child use the pacifier only a short time after meals and when going to sleep.

CONCLUSIONS [Return to TOC](#)

The transverse relationship between the dental arches should be evaluated in pacifier-sucking children at the age of 2 to 3 years. If interfering contacts between the primary canines exist, the parents should be instructed to reduce the sucking time.

ACKNOWLEDGMENTS

The author wants to express his gratitude to Skaraborgsinstitutet for supporting this publication. A special thank-you goes to Professor Samir Bihara for editing this publication as well as to Ms Lisa Fogelberg, Ms Erene Ek, and Ms Brita Einehag for important contributions in collecting the material.

REFERENCES [Return to TOC](#)

1. Modeer T, Odenrick L, Lindner A. Sucking habits and their relation to posterior crossbite in 4-year-old children. *Scand J Dent Res*. 1982; 90:323–328. [[PubMed Citation](#)]
2. Köhler L, Holst K. Malocclusion and sucking habits of four-year-old children. *Acta Paediatr Scand*. 1973; 62:1–7. [[PubMed Citation](#)]
3. Kisling E, Krebs G. Patterns of occlusion in 3-year-old Danish children. *Community Dent Oral Epidemiol*. 1976; 4:152–159. [[PubMed Citation](#)]
4. Larsson E. Dummy- and finger-sucking in 4-year-olds. *Swed Dent J*. 1978; 68:219–224.

5. Ogaard B, Larsson E, Lindsten R. The effect of sucking habits, cohort, sex, intercanine archwidths, and breast or bottle feeding on posterior crossbite in Norwegian and Swedish 3-year-old children. *Am J Orthod Dentofacial Orthop.* 1994; 106:161–166. [[PubMed Citation](#)]
6. Larsson E. The effect of dummy-sucking on the occlusion: a review. *Eur J Orthod.* 1986; 8:127–130. [[PubMed Citation](#)]
7. Proffit WR. On the aetiology of malocclusion. *Br J Orthod.* 1986; 13:1–11. [[PubMed Citation](#)]
8. 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.
9. Larsson E. Orthodontic aspects on feeding of young children. *Swed Dent J.* 1998; 22:117–121. [[PubMed Citation](#)]
10. Larsson E, Ögaard B, Lindsten R. Rearing of Swedish, Norwegian and Norwegian Samichildren. *Scand J Dent Res.* 1993; 101:382–385. [[PubMed Citation](#)]
11. Macknin ML, Piedmonte M, Jacobs J, Skibinski C. Symptoms associated with infant teething: a prospective study. *Pediatrics.* 2000; 105:747–752.
12. Klackenberg G. Thumb-sucking: frequency and etiology. *J Pediatr.* 1949; 4:418–421.
13. Traisman A, Traisman H. Thumb and finger-sucking: a study of 2,650 infants and children. *J Pediatr.* 1958; 52:566–567.
14. Bowden BD. A longitudinal study of digital and dummy-sucking. *Aust Dent J.* 1966; 11:184–190. [[PubMed Citation](#)]
15. Hanna JC. Breast feeding versus bottle feeding in relation to oral habits. *J Dent Child.* 1967; 34:243–250. [[PubMed Citation](#)]
16. Warren JJ, Levy SM, Nowak AJ, Tang S. Non-nutritive sucking behaviors in preschool children: a longitudinal study. *Pediatr Dent.* 2000; 22:187–191. [[PubMed Citation](#)]
17. Konnor M. Behavior development. In: Leiderman PH, Tulkin SR, Rosenfeld A, eds. *Culture and Infancy.* New York, NY: Academic Press. 1977;90–109.
18. Konnor M. Infancy among the Kalahari Desert San. In: Leiderman PH, Tulkin SR, Rosenfeld A, eds. *Culture and Infancy.* New York, NY. 1977;287–328.
19. Konnor M, Worthman C. Nursing frequency, gonadal function, and birth spacing among Kung hunter-gatherers. *Science.* 1980; 207:788–791. [[PubMed Citation](#)]
20. Benefo KD, Tsui AO, de Graft Johnson J. Ethnic differentials in child-spacing ideals and practices in Ghana. *J Biosoc Sci.* 1994; 26:311–326. [[PubMed Citation](#)]
21. Brazelton TB. Implications of infant development among the Mayan Indians of Mexico. In: Leiderman PH, Tulkin SR, Rosenfeld A, eds. *Culture and Infancy.* New York, NY: Academic Press. 1977;151–187.
22. Worthman CM, Jenkins CL, Stallings JF, Lai D. Attenuation of nursing-related ovarian suppression and high fertility in well-nourished intensively breast-feeding Amele women of lowland Papua New Guinea. *J Biosoc Sci.* 1993; 25:425–443. [[PubMed Citation](#)]
23. Gray SJ. Comparison of effects of breast-feeding practices on birth-spacing in three societies: Nomadic Turkana, Gainj and Quechua. *J Biosoc Sci.* 1994; 26:69–90. [[PubMed Citation](#)]
24. Gray SJ. Correlates of breastfeeding frequency among nomadic pastoralists of Turkana, Kenya: a retrospective study. *Am J Phys Anthropol.* 1995; 98:239–255. [[PubMed Citation](#)]

^a Professor, University of Oslo, Norway, and Orthodontic Clinic, Falköping, Sweden

Corresponding author: Professor Erik Larsson, Orthodontic Clinic, Danska vägen 62, 521 85 Falköping, Sweden. (E-mail: larsson.afzelius@mailbox.calypso.net)