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Dummy-sucking behaviour in 3-year old Norwegian and Swedish children

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SUMMARY Forty 3-year-old dummy-sucking children (22 Swedes and 18 Norwegians) together with one of their parents, were shown a specially prepared videotape for 15 minutes The child had free access to its dummy while watching the video. The dummy-sucking time and sucking reactions to the different film sequences were registered. The presence or absence of a posterior crossbite was recorded as well as the upper and lower intercanine arch widths. Dummy-suckers in these populations have earlier been reported to have different prevalences of posterior crossbite. The prevalence of posterior crossbite was especially high for Swedish girls. The results showed that Norwegian boys used their dummies significantly less, and the Swedish girls had significantly narrower upper dental arches than the other children. Dummy-sucking reactions to frightening, cheerful or boring parts of the video were not significantly different among the children. All the children showed compassion for the film characters, and all the children used the dummy when going to sleep. The study lends support to the hypothesis that dummy-sucking influences arch widths and increases the likelihood for development of a posterior crossbite.

Introduction

The use of dummies/pacifiers by small children has increased over the past decades, as well as the tendency to prolong the habit (Larsson, 1971, 1986; Larsson *et al.*, 1992; Modéer *et al.*, 1982). Recently, Larsson *et al.* (1992) observed a difference in the prevalence of dummy-sucking habits between Swedish and Norwegian children. Another finding was a higher prevalence of unilateral posterior crossbite among Swedish dummy-suckers, especially girls. The influence of the dummy could be one important factor as well as others e.g. inheritance, other habits or food consistency.

There are two psychological theories about the reason for a prolonged sucking habit. The behaviourists consider it just a matter of a prolonged habit which could become somewhat disturbing for the child (Andersson and Tode, 1971). According to the psychoanalysts, prolonged sucking habits are symptoms of a mental disturbance which could be either fixation or regression in the child's mental development (Andersson and Tode, 1971; Davidson *et al.*, 1967). These investigations were made on older children with a prolonged finger-sucking habit. Also a child with a prolonged dummy-sucking habit could be expected to act in the same way. Therefore, if a child with a dummy-sucking habit becomes stressed, impatient or frightened you could expect this to become visible through the child's sucking behaviour.

The aim of the present study was to examine dummy-sucking behaviour in children exposed to standardized conditions. A videotape was used to examine the dummy-sucking behaviour in two different populations previously investigated and found to have different prevalences of sucking habits and posterior crossbites (Øgaard *et al.*, 1994).

Subjects and methods

The subjects consisted of 22 Swedish (12 boys, 10 girls) and 18 Norwegian (10 boys, 8 girls) 3-year old children. The children were from the Falköping and Lillehammer areas where earlier prevalence studies have been undertaken. Only children with a continuing dummy-sucking

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habit participated. One Swedish child with a bilateral crossbite was excluded.

In the study, the child, together with one parent, was shown a videotape for 15 minutes The video was mixed and had a boring start followed by a cartoon that was interrupted and then continued. Finally, the video ended in a silent manner showing a baby playing with dummies. The child's dummy was placed on a table in front of the child when the video started. The parents were told not to make any comment whatsoever concerning the dummy or the use of it. The purpose was to enable the child to use the dummy as desired. During this 15 minutes the child was recorded with a videocamera that was turned on with a remote control. The child and the parent were left alone during the 15 minutes.

The prevalence of posterior crossbite was recorded. The parents were asked if they took the dummy when going out with the child and if the child used the dummy when going to sleep. The tapes of the children were later examined and when and for how long they used their dummies was registered. The time when the child had their fingers in the mouth/around the lips was also recorded. This was only recorded when the dummy was not in use. Registration of a child's sucking behaviour was carried out on five different occasions: 10 seconds after the cartoon started, 10 seconds after the interruption of the cartoon, 10 seconds after the two most exciting moments in the film and 10 seconds after the film with the baby playing with dummies started. The child's ability to talk understandably with the dummy in the mouth was evaluated by asking the parents and by listening to the videotape.

The distances between the maxillary deciduous canines, and the mandibular deciduous canines were measured in all but four Norwegian children who did not co-operate. The measurements were made to the closest 0.5 mm and the reliability of the measurements was calculated after double recordings by two different investigators on 15 children, using Dahlberg's formula (1940). One-tailed *t*-tests were used to evaluate whether sucking time was greater among girls compared with boys, Swedes compared with Norwegians, children with and without unilateral posterior crossbite, and among children whose parents took the dummy when going out compared to those who did not. Two-tailed *t*-tests were made for the parameter oral contact time.

Previously, it has been shown (Øgaard *et al.*, 1994) that Swedish maxillary arches are smaller in these two populations and that the prevalence of unilateral posterior crossbite is higher among girls than boys. Therefore, one-tailed *t*-tests were used when comparing arch widths for the children in this study.

Results

Sucking time was significantly greater for girls compared with boys ($P<0.05$) (Table 1). Separated according to sex, Norwegian boys had a significantly shorter sucking time than the other children (Table 1). Sucking time for the Swedes was 7.2 minutes compared with 4.9 minutes for the Norwegians. This difference was not significant at the 5 per cent level. Sucking time was not significantly greater for the children with crossbite compared with the ones without crossbite at the 5 per cent level ($P=0.07$) (Table 2). Sucking time was significantly greater for the children whose parents took the dummy when going out compared with those who did not ($P<0.05$) (Table 3). The same tests were made for the parameter 'fingers in oral contact'. The only significant difference was that

Table 1 Mean sucking times in min for girls and boys and for Swedes and Norwegians separated by gender. Total observation period was 15 min.

	No.	Mean		SD
Swedish girls	10	7.7		6.8
			8.0	6.7
Norwegian girls	8	8.5		6.9
Swedish boys	12	6.8		5.4
			4.6*	5.6
Norwegian boys	10	2.0*		4.8

SD = Standard deviation.
*Significantly different at the 5 per cent level.

Table 2 Mean sucking times in minutes for children with and without crossbite.

	No.	Mean	SD
Crossbite	10	8.8	6.2
No crossbite	30	5.3	6.1

SD = Standard deviation.

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Table 3 Mean sucking time in minutes for children using the dummy outdoors and for those who did not. One parent did not answer this question.

	No.	Mean	SD
Using dummy outdoor	14	8.8	6.8
Not using dummy outdoor	25	5.0*	5.5

SD = Standard deviation.
*Significantly different at the 5 per cent level.

the children with a unilateral posterior crossbite showed less oral contact time when compared with children without ($P<0.05$) (Table 4).

Eight of the Swedish and two of the Norwegian children had a unilateral posterior crossbite. The upper intercanine arch width was significantly shorter for the Swedish children ($P<0.01$) (Table 5). When separated by gender, the Swedish girls had narrower upper intercanine arch width compared with the other groups ($P<0.05$) (Table 6). The error variance of the measurements was calculated to 0.32 mm for the upper jaw and 0.26 mm for the lower jaw.

During the five selected stress situations, it was noted that all the children showed compassion for the cartoon characters when the film was frightening. Also fewer children talked during these occasions. The boring part of the video did not give rise to any uniform reaction. When the cartoon started and when the baby playing with dummies was shown, many children became cheerful and many comments were made. Some children paid more attention to their own dummy when they saw the baby with dummies. However, there was no significant increase in the use of dummies at this moment. All the children who talked with the dummy in the mouth could do so understandably. This was in agreement with the parents' reports. When the dummies were in use, they were held passively most of the time and were only sucked occasionally. All the children used a dummy when going to sleep and this was the most important time for using the dummy.

Table 4 Mean times (minutes) for fingers in the mouth or in contact with the lips for the groups as in Tables 1–3,5.

	No.	Mean	SD
Girls	18	1.4	2.8
Boys	22	1.1	2.2
Swedes	22	0.7	1.5
Norwegians	18	1.8	3.3
Crossbite	10	0.3	0.8
No crossbite	30	1.5*	2.8
Using dummy outdoor	14	1.6	2.9
Not using dummy outdoor	25	1.1	2.2

SD = Standard deviation.
*Significantly different at the 5 per cent level.

Table 5 Mean upper and lower intercanine arch width in mm for the Swedes and Norwegians.

	No.	Mean	SD
53–63 Swedes	22	25.8	1.8
Norwegians	14	27.6**	1.7
83–73 Swedes	22	23.1	1.6
Norwegians	14	23.5	1.6

SD = Standard deviation.
*Significantly different at the 1 per cent level.

Table 6 The mean upper intercanine arch width in mm for the Swedes and the Norwegians when separated by gender.

	No.	Mean	SD
Swedish girls	10	24.8*	1.8
Boys	12	26.6	1.4
Norwegian girls	7	27.6	2.1
Boys	7	27.6	1.4

SD = Standard deviation.
*Swedish girls significantly different from the others at the 5 per cent level.

Discussion

It is well recognized that dummy-sucking is of great importance for the development of unilateral posterior crossbite in the deciduous dentition (Larsson, 1975, 1986). Of importance is probably for how many years the child sucks as well as for how many hours each day (Lindner and Modéer, 1989; Kristensen, 1992). However, in this study it was not possible to show a statistically significant correlation between the length of time the child had the dummy in the mouth and the prevalence of crossbite. Of the 10 children in this study with a unilateral posterior crossbite, two children did not use a dummy during the video. These two were Swedish girls. These children did not use a dummy when going out, nor did they display much oral contact during the test. Because of the small size of the groups, the registrations

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for these two girls came to play an important role in the statistical analysis.

The present, as well as previous, studies (Larsson, 1986; Øgaard *et al.*, 1994) have led the authors to suggest an hypothesis about the relationship between dummy-sucking and crossbite: For many children the dummy has become a natural part of the oral environment. The dummy is in the child's mouth most of the time during the day and often throughout the night. The dummy is not often sucked, but simply stays in the mouth passively. When playing, for instance, it is a good way for the parents to prevent the child from putting things into the mouth. Most children are so used to the dummy that they are capable of speaking quite understandably with it in the mouth. As the teat of the dummy has become almost a natural part of the mouth, changes will occur in the surrounding tissues. The tongue has to take a lower position in the anterior part of the mouth. In this way the palatal support of the upper deciduous canines and first molars against the pressure of the cheeks is reduced. The tongue will also exert increased lateral pressure on the lower canines and first molars (Fig. 1). 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. Both these changes in equilibrium act towards a transversal disharmony in the canine region, which will increase the risk of developing a posterior crossbite. This hypothesis has been supported in a newly presented thesis by Moore (1994).

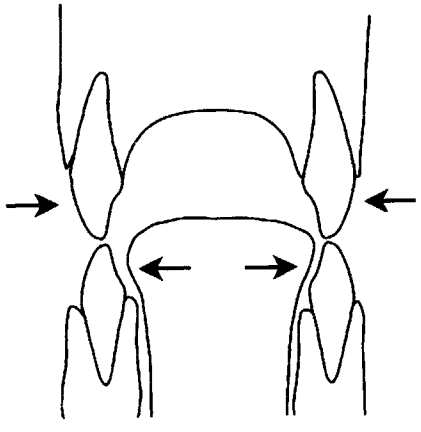

Figure 1 As the teat of the dummy forces the tongue to take a lower position in the anterior part of the mouth, the palatal support of the upper deciduous canines and first molars against the pressure of the cheeks is reduced. The tongue will also exert increased lateral pressure on the lower canines and first molars.

According to Proffit (1986), a pressure towards the teeth has to exist for at least 6 hours per 24 h (25%) to result in tooth movement. In this study girls had an average sucking time of 53% and Swedish children of 48 per cent of the observation time. According to the anamnestic data all children used their dummy when going to bed. The experimental sucking time supported the anamnestic parameter. The children who were said to use the dummy outdoors showed significantly longer sucking time in this study. Therefore, it seems reasonable to presume that the Swedish girls in this study had the dummy in their mouth on average for more than 6 hours in 24 hours. However, Lindner and Modéer (1989) reported an average sucking time of 4.5 hours in 24 hours in 4-year-old dummy-suckers with posterior crossbite. It is probable that a higher value would have been observed if they had separated the girls from the boys. Also the risk exists that parents underestimate the time a child has the dummy in its mouth when answering a questionnaire. Perhaps differences in hours per day with the dummy in the mouth could explain why Swedish girls develop a posterior crossbite more often than the other children. However, in this study Swedish boys and girls and Norwegian girls had the dummy in their mouth for about half the observation time and the Norwegian boys for a significantly shorter time.

There was no uniform reaction to the five selected stress test situations when considering the age of the child at the commencement of the habit. When the dummy was used, it stayed in the mouth passively most of the time. The dummies were used by everyone when going to sleep, and this supports the idea of sucking as a comforting activity or a simple connection with rest.

It has been shown that Swedish children have narrower upper jaws compared with Norwegians and this is also true for the children without a previous sucking habit. A high prevalence of posterior crossbites, especially among Swedish girls has also been reported (Øgaard *et al.*, 1994). The present investigation supports the hypothesis that dummy-sucking time contributes to the development of crossbites, and that the important factor appears to be the

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difference between the upper and lower arch widths.

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