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FINGER-SUCKING IN CHILDREN A STUDY OF INCIDENCE AND OCCLUSAL CONDITIONS

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In this examination of predominantly 12-year old children the overall incidence of finger-suckers was 30.7 per cent. The habit had been given up by 17.4 per cent before school age, while 1.9 per cent still had this habit at the time of the study. Prolonged finger-sucking was more common in girls than in boys. The overall incidence of nail-biters was 26.6 per cent. Finger-sucking and nail-biting habits showed a tendency of coinciding. Orthodontic treatment had been received by 13.4 per cent of the children.

The investigation showed that the finger-sucking habit had led to a decreased overbite and an increased overjet, but no postnormal molar relation. No obvious improvement of finger-sucking anomalies could be shown after the habit had been given up, when this had persisted until the age of 12—14 years.

A number of studies show that finger-sucking can cause deformities in the dentition. These are greatest in the anterior portion which often shows an open bite and protruding upper incisors. The biteopening can be asymmetrical according to the location of the sucking finger. A certain tendency towards unilateral cross-bite conditions and a posterior dislocation of the lower dental arch is also present. At the same time it has been found that the dental deformities show a great tendency of regression, at least if the habit of finger-sucking is given up relatively early (*Kjellgren, 1939; Toverud, 1940; Seipel, 1948; Ruttle et. al. 1953; Traisman & Traisman, 1958; Lundström, 1959*).

The authors studied children, predominantly at the age of 12 years with the purpose of elucidating:

1. the incidence of finger-suckers in various age groups;
2. the effect of finger-sucking on the dentition;

3. the possibility of spontaneous improvement of finger-sucking anomalies if the habit has persisted until the age of 12 to 14 years.

MATERIAL AND METHODS

Questionnaires were distributed among all 9,877 pupils in grade 6 of the Stockholm elementary schools in the spring of 1962. The returned 8,158 forms represented 82.6 per cent of the school children.

Both sexes were equally represented, 4,093 (50.2 per cent) were boys, and 4,065 (49.8 per cent) were girls. Nearly all the children were 12 years old (born 1949).

The parents of the children were asked to complete the forms which, in addition to the questions on the finger-sucking habits of the children also included questions as to their habit of nailbiting and eventual orthodontic treatment.

On the basis of the questionnaires, the incidence of finger-sucking at various ages was then evaluated, as well as that of nail-biting and orthodontic treatment.

From the total material 766 pupils with various habits of finger-sucking were chosen at random for a comparative study of dental conditions. A total of 729 children attended the initial examination. They were divided into five groups in respect of the duration of their finger-sucking habits (Table I).

From the five groups 73 children were excluded because of orthodontic care; 56 for practical reasons (they had been treated by a number of different dentists), and 17 because of insufficient data. Another 32 children had got orthodontic treatment at the Eastman Institute and as the therapy might influence the authors' measurements these children were grouped into a sixth category — the Eastman material.

Groups 1–5 thus included children who were not considered to have undergone orthodontic treatment. The children were nearly all 12 years of age.

Group 6 included children who had received orthodontic care at the Eastman Institute. The measurements in this group were carried out on casts and not, as in other groups, directly in the mouth. The casts had been made prior to treatment. At this time, the children had not reached the age of 12 years. 71.9 per cent of the Eastman children had some form of finger-sucking habit.

The Eastman material represented all the children in the study who had undergone orthodontic treatment. A comparison to the 56 children who

Table I.

Grouping of study material in respect to finger-sucking habits and orthodontic treatment

Group	Total number	Boys	Girls	Belonging to duplicate re-cording group
1. Still finger-sucking at age of examination (12—13 years)	124	47	77	21
2. Finger-suckers who had given up this habit at age of 10—13 years	132	46	86	3
3. Finger-suckers who had given up this habit at age of 7—9 years	118	44	74	1
4. Finger-suckers who had given up this habit before school age (at the age of 2—6 years)	121	43	78	5
5. Children without habits (Finger-sucking children up to the age of 2 years have been included in this group)	129	48	81	14
6. The Eastman material	32	12	20	
	656	240	416	44

had been treated elsewhere showed however that they could be considered a representative group.

Since all the children with orthodontic treatment regarding the overbite, the overjet and the molar relation were excluded from groups 1—5, it might be suspected that those cases had been eliminated in which finger-sucking had led to an obvious deformity. For this reason the children with orthodontic care (both the Eastman-group and the others) were divided into two groups according to the existence of finger-sucking habits. The measurements of the casts made before treatment were compared. The percental incidence of overjet exceeding 5 mm was 8.3 in non-finger-suckers and 50.0 in finger-suckers. The difference of 41.7 per cent was found to be significant on the 5 per cent level.

The purpose was as well to investigate, by cast analyses, the self-correction of any finger-sucking anomalies in cases where the habit was given up at the age of 12—14 years. 147 children, 51 boys and 96 girls, who were still sucking their fingers when first examined (spring 1962) were called to the School of Dentistry again in the spring of 1963 and 1964. In 1963, 114 children were investigated, 44 boys and 70 girls. 19 children failed to appear and 14 had to be excluded for having undergone orthodontic treatment of such a nature that it was impossible to study any improvement that may have occurred spontaneously. In 1964, 107 children were examined (41 boys and

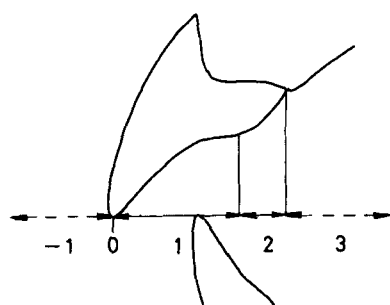


Fig. 1. The overjet group divided into five subgroups.

Group 0 were cases with an end-to-end incisal bite.
 Group 1 had a normal or a nearly normal overjet.
 Groups 2 and 3 had an increased overjet.
 The negative group were cases of frontal inversion.

66 girls). For orthodontic reasons, 23 children were excluded, and 17 stood away.

The children who had been chosen for a comparative study were called to the School of Dentistry and their occlusion was assessed by the two investigators.

The dentition was examined in respect to:

a. *Overjet*

- measured by slide gauge along the occlusion plane at 1+ and +1;
- by inspection grouped into five classes as shown in Fig. 1.

b. *Overbite*

grouped as in Fig. 2.

c. *Molar teeth relation*

recorded at 6+/6- and +6/-6 and measured in units of a half cusp width (see Fig. 3).

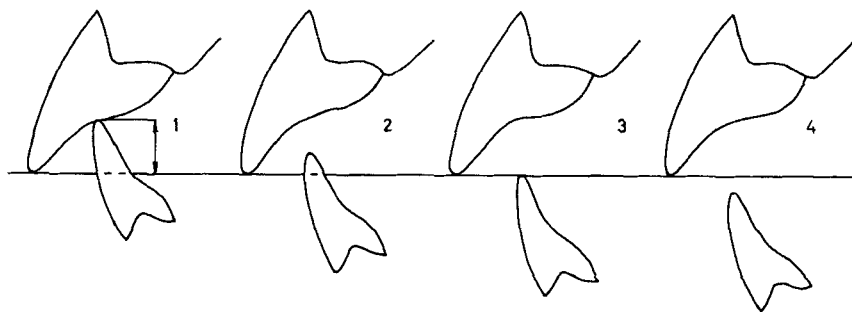


Fig. 2. The overbite group divided into four subgroups.

Subgroup 1 meant contact between upper and lower incisors, groups 2, 3 and 4 various grades of open bite. The horizontal line represents an imagined plane through the cutting edge of +1 and 1+ and the mesio-buccal cusps of +6 and 6+.

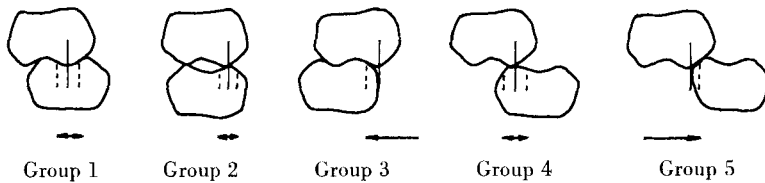


Fig. 3. Molar relations in five groups.

The measuring points were the mesiobuccal cusp tips of +6 and 6+ and the mesiobuccal fissures of -6 and 6-. Group 1 was a so-called normal occlusion, groups 2 and 3 postnormal and groups 4 and 5 prenatal occlusions.

The molar relation was judged to be recordable if all teeth distal to the canine tooth on the side in question were present and stood in the dental arch without being crowded.

When examining the rate of improvement, impressions of the dentitions were made at all three examinations. The casts were made in hard plaster.

Comparative measurements with slide gauge were carried out by one of the investigators.

The measurements were made in respect to:

- a. *The overjet* calculated at 1+ and +1 (see p. 502).
- b. *The overbite* measured at 1+ and +1 and defined as the vertical distance between the cutting edges of the upper and lower incisors (see Fig. 2.1).
- c. *The molar relation*. The distance between the mesio-buccal cusp tip of the first upper molar and the mesio-buccal fissure of the first lower molar was measured along the occlusion plane. As to measurable jaws, see above.

The differences as regards overjet and overbite and molar relations were calculated between the first and second, and the first and third examination, respectively, for each individual. After one year the values of children who were still sucking their fingers were compared with those who had given up sucking during the course of the year. After two years the values of those children who were still sucking their fingers were compared with those who had given up sucking in 1962-63 and the children who had given up in 1963-64. The two latter groups were also compared with one another.

Duplicate determinations. Duplicate determinations were made at the clinical examinations of the children and at the examination of the casts.

Both clinical recordings were done at the same occasion. The comparative

Table II.
Coinciding and diverging recordings at duplicate determinations

	Number of coinciding recordings	Number of diverging recordings
Overbite	40	4
Overjet (grouped in classes)	32	12
Molar relation, right	40	4
Molar relation, left	34	10

material included 44 children grouped as shown in Table I. The results are shown in Table II.

The error in single evaluations was calculated for the values of the overjet at 1+ and +1 that resulted when measuring with slide gauge. The method error was relatively large amounting to about 0.5 S.D. for the material which constituted the basis for evaluation of the average values in Fig. 6.

The measuring errors when examining the spontaneous ability of improvement of finger-sucking occlusal conditions were so small that they can be disregarded.

RESULTS

Incidence study

The 8,158 children who had returned completed questionnaires could be grouped as shown in Table III and Figs. 4 and 5 in regard to the duration of their finger-sucking habits and the presence of nail-biting.

Table III shows that about half of the group had finger-sucking and/or nail-biting habits. In per cent, more girls than boys showed such habits (51.5 per cent against 42.2 per cent — a very significant difference).

The total incidence of finger-sucking was 30.7 per cent (2,508 children). More than half of the children (57 per cent) had given up this habit already before school age. Finger-sucking up to the age of 12–13 years was comparatively rare. In this material, the incidence was 1.9 per cent and there was an obvious predominance of girls compared to boys. Nail-biting, but no finger-sucking habits, occurred in 16.1 per cent of the children. In this respect, the figures for boys and girls coincided.

Fig. 4 shows that finger-sucking, as expected, decreased with increasing age. The predominance of girls did not manifest itself until school age.

The distribution of nail-biting children is shown in Fig. 5. The incidence

Table III.
Grouping of material as to finger-sucking, nail-biting and sex

Group	Total		Boys		Girls	
	No.	%	No.	%	No.	%
1. Finger-suckers*) at age of examination (12—13 years)	151	1.9	51	1.2	100	2.4
2. Finger-suckers who had stopped at the age of 10—13 years	282	3.5	88	2.2	194	4.8
3. Finger-suckers who had stopped at the age of 7—9 years	650	8.0	230	5.6	420	10.3
4. Finger-suckers who had stopped at the age of 2—6 years	1,425	17.4	690	16.9	735	18.1
5. Children without finger-sucking or nail-biting habits	4,336	53.1	2,366	57.8	1,970	48.5
6. Children without finger-sucking, but with nail-biting habits	1,314	16.1	668	16.3	646	15.9
	8,158	100.0	4,093	100.0	4,065	100.0

*) Some of the children in groups 1—4 were also nail-biters

of nail-biters was not as large as that of finger-suckers amounting to 26.6 per cent (2,170 children). The percentage of nail-biters was higher among girls.

An analysis revealed a significant relationship between finger-sucking and nail-biting habits. Nail-biting in finger-suckers occurred in 34.1 per cent, and in non-finger-suckers in 23.3 per cent.

1,094 school children were stated to have undergone orthodontic treatment which corresponds to 13.4 per cent of the entire material.

Comparative examination of occlusal conditions

The results of the various groups of finger-suckers is shown in Figs. 6, 7 and 8. (For definitions of groups 1—6 see Table I).

Significance analyses were made by calculating the CR-values (critical ratios), which have an approximately normal distribution, in order to elucidate the differences between the groups.

An analysis of the values of overjet obtained by slide gauge showed a great number of significant differences between the various groups, especially

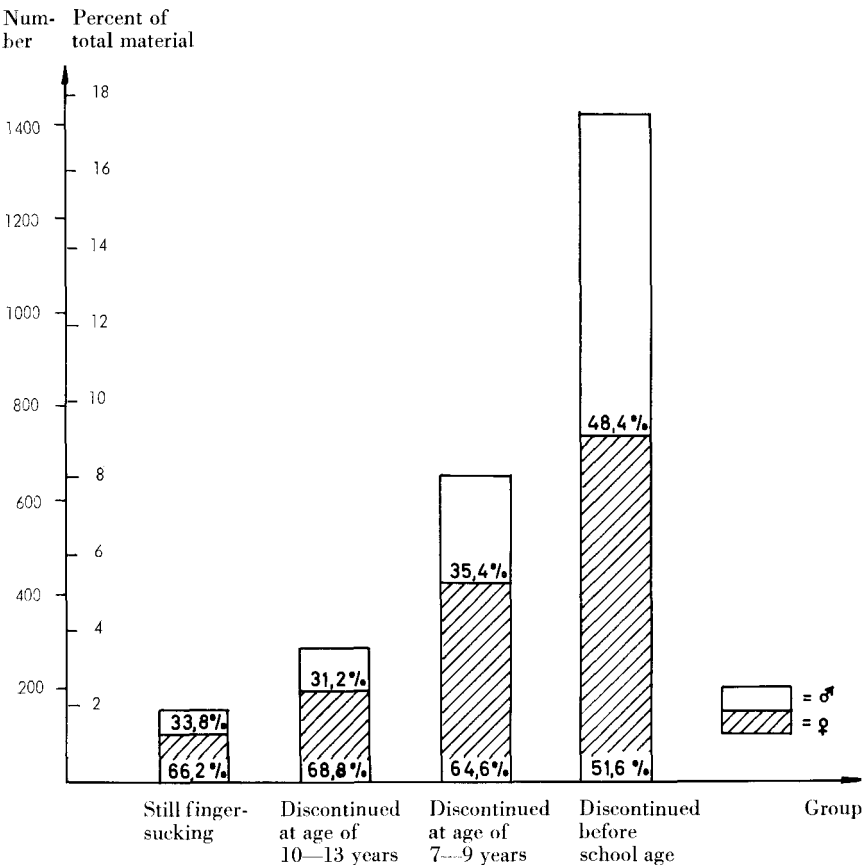


Fig. 4. Finger-sucking in 2,508 girls and boys in age groups 2—12(13) years.

in girls, which is explained by the fact that the material contained more girls than boys.

Groups 1, 2 and 3 did not show significant divergencies within their groups. These three groups showed nearly throughout a higher average value than the fourth and especially the fifth group. Significant differences were present. There was no demonstrable difference between the fourth and the fifth group. The Eastman group had the highest values and showed some significant difference compared with all the other groups, except the first group.

The difference in overjet between the various groups in those cases in which this had been determined by classification, were studied by defining the average value of the grades —1,0 1,2 and 3 for each group. The signif-

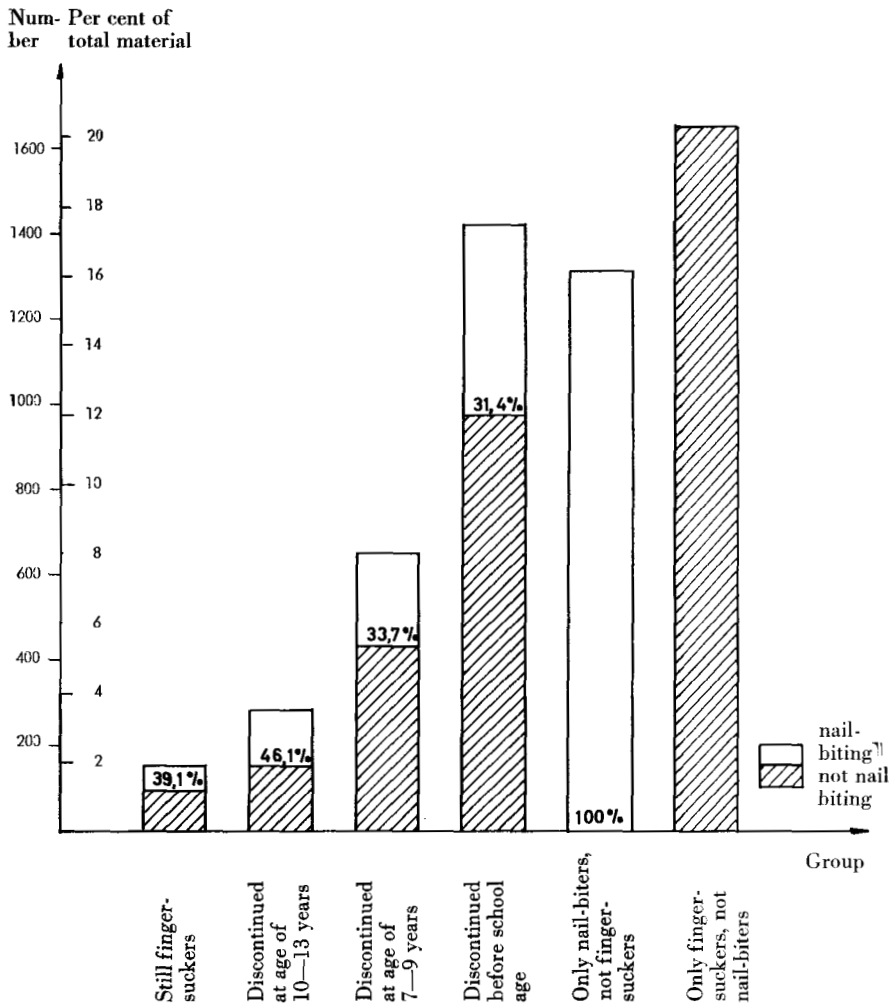


Fig. 5. Distribution of nail-biting in boys and girls compared with their finger-sucking habits. (Whole columns 1-4 represent the number of finger-sucking children in the various groups. The figures in the white parts of the columns indicate the percentage of nail-biting children.)

icans analysis showed a remarkably high average value for boys in the third group (but not for girls). The Eastman material also showed a significantly high average value compared with the second, fourth and fifth groups.

As in the cases of overjet, the overbite was studied by defining the average value for the various grades of overbite conditions in each group. The analyses showed that significant differences were present between group 1 and

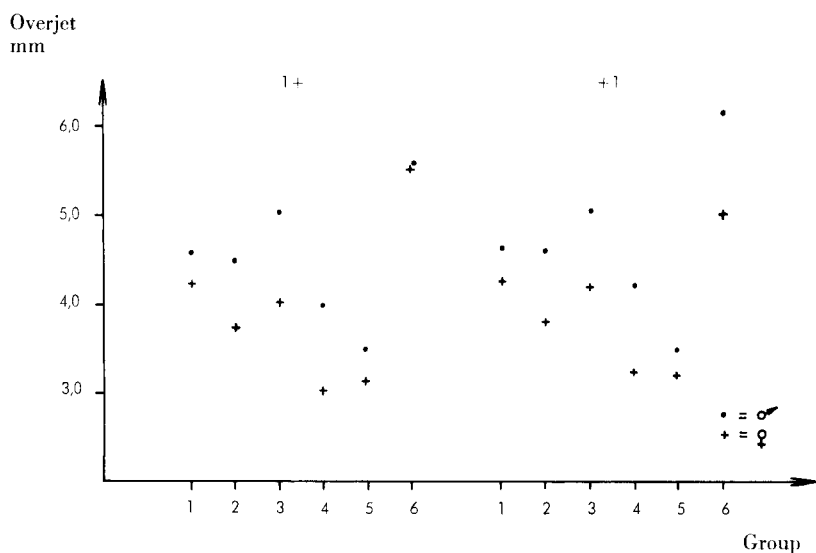


Fig. 6. Overjet measured in mm in children with various habits of finger-sucking. (Average values. As to group distribution, see Table I).

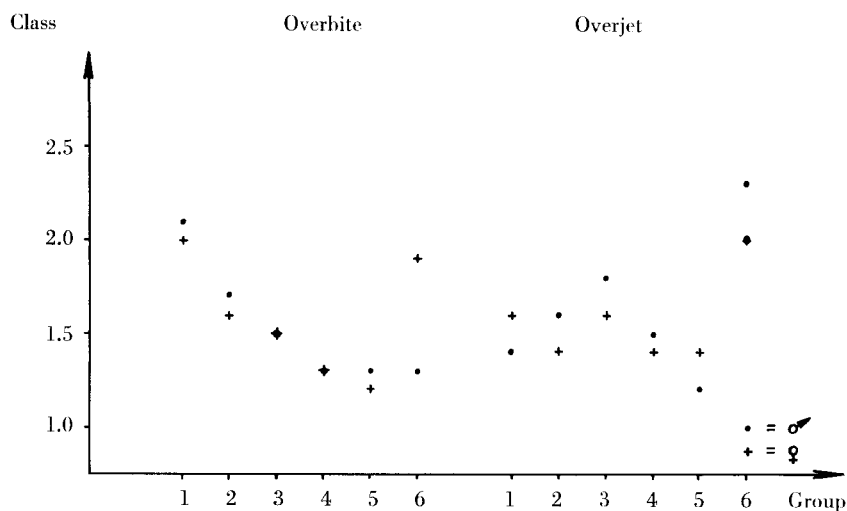


Fig. 7. Overbite and overjet quantified in classes in the children in fig. 6. (Average values. As to classes, see p. 502, as to finger-sucking groups, see Table I).

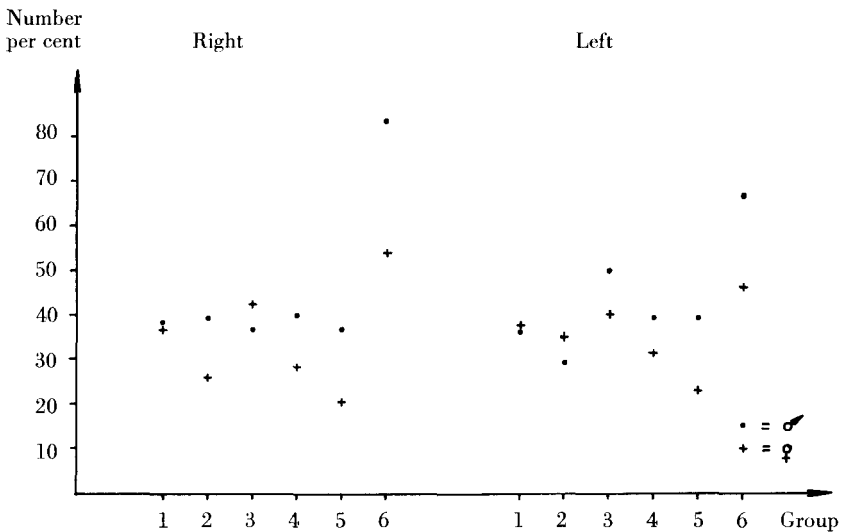


Fig. 8. Number of children in per cent in the various examined groups with postnormal molar relation on right and left side respectively. (As to group distribution, see Table I).

every other group ($P < 0.001$). The children who were still finger-sucking had a more open bite than other groups. Group 2, however, displayed a larger bite opening than groups 4 and 5 ($P < 0.001$ for girls in both groups, $0.001 < P < 0.01$ for boys in group 4, and $0.01 < P < 0.05$ in group 5), as well as group 3, compared with groups 4 and 5 ($0.01 < P < 0.05$ and $P < 0.001$ respectively for girls). The girls of the Eastman group had a more open bite than the girls in groups 4 and 5.

The molar relation was studied by recording, in every examination group, the number of cases with postnormal occlusion on the right and left side respectively. The analysis of the values arrived at showed two single significant differences for girls. The total of children of both sexes also showed two single significant differences between various groups, displaying more cases with postnormal relation on the right side in the Eastman material than in groups 2 and 4.

Comparative examination of casts

On comparison, after one year (between the first and second examination), the measuring results obtained in children who still sucked their fingers and in children who had given up this habit in the course of the year, two single significant differences were observed when analyzed by an evalua-

tion of the normally distributed CR values. The differences were in the overbite at +1 in boys, and in the molar relation on the left side in girls. None of the differences was significant if both sexes were included in the evaluation. They could therefore not be of any conclusive evidence.

When analyzing the differences after two years, only one significant difference was obtained, i.e. in respect of the overbite condition at 1+ when comparing boys who were still sucking their fingers with boys who had given up this habit between the second and third examination.

DISCUSSION

The incidence of finger-suckers was 30.7 per cent. The majority of incidence values indicated in literature vary between about 13 per cent and 45 per cent (*Kjellgren*, 1939; *Toverud*, 1940; *Scipel*, 1948; *Traisman & Traisman*, 1958; *Klackenberg*, 1960). The variability of incidence values can partly be explained by the fact that the statements made by the children's mothers generally were made a long time after finger-sucking had been observed.

The habit of finger-sucking had been given up in more than half of the cases before the children had reached school age, while 1.9 per cent still sucked their fingers at the time of this study. This figure may be higher as it cannot be ruled out that some of the children who were still sucking did not want to report this. The incidence of nail-biting was also studied, as this habit has been considered to differ from finger-sucking although both habits represent a contact between mouth and hand. Nail-biting was characterised as an active behaviour by *Klackenberg* (1960), while finger-sucking is said to be a passive way of reaction. Nail-biting habits — either still active or found in the anamnesis — were displayed by 26.6 per cent of the children. In the present material, the percentage of finger-suckers among nail-biters was 39.4 per cent, and among non-nail-biters 27.6 per cent. The difference between these figures is significant and shows an association between nail-biting and finger-sucking habits.

The results obtained at the comparative evaluation of dental conditions of the 766 school children indicate that the children with finger-sucking habits in the permanent dentition or the mixed dentition displayed a larger overjet than the children who had either given up this habit before school age or not sucked at all. The objection may be made, however, that the children in the first groups had not had the same time for any improvement as the children, who had stopped sucking before school. The fact that the East-

man group had the highest values in overjet is natural as this group consisted of children who had been referred to the dental-orthopedic department at the Eastman Institute for their great need of orthodontic treatment.

The results regarding the overbite also indicate that finger-sucking had a greater influence on the dentition after the age of 7 years than before. Here, too, the children in groups 1, 2 and 3 had had a shorter time for any improvement than the children in group 4.

The dental changes that could be observed in prolonged finger-suckers were usually located in the anterior region. This conclusion was drawn from a material where the children had not received any orthodontic treatment (see groups 1–5). The children who had undergone orthodontic treatment were grouped separately — the Eastman material. As finger-sucking habits occurred in 71.9 per cent of the Eastman children, an incidence that strongly and significantly exceeded the corresponding incidence in the total material (30.7 per cent), it cannot be ruled out that just the cases where finger-sucking had led to more obvious dental changes may have been excluded in groups 1–5. The effect of finger-sucking may consequently be stronger than arrived at in the present study. The comparative examination of the casts of 62 children who had undergone orthodontic treatment also showed a correlation between overjet (exceeding 5 mm) and finger-sucking.

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CONCLUSIONS

1. Children who were still finger-suckers had a more open bite than children in the other examined groups.
2. Children with finger-sucking habits after the age of 7 years showed an increased overjet and a decreased overbite condition compared with children who either had given up sucking at the age of 2–6 years, or who had never had this habit.
3. No evidence was obtained to prove that a postnormal molar relation should be more common in children with finger-sucking habits than in children without these habits.
4. No self-correction of finger-sucking anomalies due to the discontinuance of the finger-sucking habit could be shown at the ages of 12–14 years.

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