

The association of incisor protrusion with digit sucking and allergic nasal itching

Andrew B. Murray, M.B., M.R.C.P.(E), D.C.H., and
Donald O. Anderson, M.D., F.R.C.P.(C),
Vancouver, B. C., Canada

Children rub their noses to relieve the itching of allergic rhinitis. The associated itching of the palate may be relieved by rubbing or by sucking a digit. Digit sucking is said to be a cause of incisor protrusion (excess overjet). A team comprised of a pediatric allergist, an otolaryngologist, a technician, and an interviewer studied 354 Vancouver primary school children. One year later their mothers were re-questioned by another interviewer. There was no increase in the prevalence of incisor protrusion in children with a stuffed nose or with enlarged adenoids. Digit sucking on its own doubled the prevalence of protrusion. When, in addition to digit sucking there was evidence of allergic itching, the prevalence of protrusion was increased about five times (statistically significant). Evidence of allergic itching alone did not increase its prevalence. Digit sucking is clearly related to incisor protrusion. It is postulated that allergic palatal itching is a stimulus for increased digit sucking in children with this habit, resulting in more incisor protrusion.

Allergic rhinitis may cause chronic itching¹ which children tend to relieve by rubbing the tip of the nose upward.² If done repeatedly, a line forms across the top of the nose, the so-called nasal crease³ (Fig. 1A).

In allergic rhinitis the palate may also itch.⁴ This can be relieved by rubbing it with the tip of the tongue or a finger (Fig. 1B) or by sucking a finger or thumb (Fig. 2).

Evidence is presented that thumb or finger suckers with allergic itching of the nose have a higher prevalence of incisor protrusion (excess overjet); it is postulated that this is due to increased thumb or finger sucking to relieve accompanying itching of the palate.

From the Department of Paediatrics and Department of Health Care and Epidemiology, University of British Columbia.

Supported in part by National Health Grant 609-7-111.

Reprints from: Dr. A. B. Murray, 601-750 West Broadway, Vancouver 9, B. C., Canada.

Received for publication Dec. 18, 1968.



Fig. 1A
Nasal crease on 9-year-old boy with allergic rhinitis.



Fig. 1B
Same boy, rubbing his palate to relieve itching.



Fig. 2

X-ray picture of a 7½-year-old girl, who has allergic rhinitis, sucking her barium-covered thumb. It is pushed against the roof of her mouth and against the upper incisors, which protrude.

POPULATION AND METHODS

Three hundred and fifty-four Vancouver primary school children were examined in the course of another study^{5, 6} of hearing loss. The sample was selected such that half the children had a hearing loss and half had normal hearing. In the present analysis, both groups are combined to examine the relationship between excess overjet and evidence of allergic nasal itching, digit sucking, nasal obstruction, and enlarged adenoids.

The research team visited the schools. Each member used a separate room so that none would know what the others had found. No one knew whether a case or a control subject was being examined.

A trained nonmedical interviewer gave a precoded questionnaire of allergic symptoms to the mother. Each question was recorded as positive only if the symptom had been present for as long as 3 weeks at a time during the past year. The symptoms were: much nose rubbing or the complaint of an itchy nose, fits of sneezing, nasal stuffiness or snorting, and runny nose or sniffing.

The otolaryngologist* used a postnasal mirror to examine the adenoids in all children who permitted it. The adenoids were said to be enlarged when, in his opinion, they were big enough to interfere with the nasal airway or to obstruct his view of the eustachian pillar.

* Dr. K. G. Cambon.

The pediatric allergist (A. B. M.) inspected the nose for signs of allergy. A nasal crease was said to be present when there was an apparently permanent line across the top of the nose in the position in which a crease formed when the tip of the nose was pushed up. He noted whether the nasal turbinates were pale, swollen, or wet.

He also inspected the teeth. Excess overjet was said to be present when, in his opinion, there was obvious protrusion of the upper incisors relative to lower incisors. Otherwise normal overjet was recorded.

The allergist also made a nasal smear and put a serial number on the slide. This was later processed for eosinophils by the technician. Eosinophilia was said to be present when there were ten eosinophils per high-power field in any two high-power fields.⁶

In order to determine the effect of allergic nasal itching, the children were divided into two groups. Those with its symptom (nose rubbing or itching), sign (nasal crease), or cytologic finding (nasal secretion eosinophilia) were said to have evidence of allergic nasal itching. Those with none of these features were said to have no evidence of allergic nasal itching.

Approximately one year later, two other trained nonmedical interviewers attempted to find as many of the mothers who were previously questioned as possible. They were able to trace and interview 319 (90.1 per cent of the original group); the other 35 could not be reached, most of them having left the city. Those found were asked on this follow-up visit whether their child had sucked his thumb or fingers even after the age of 3 years. The children who were said to have done so will be referred to hereafter as "digit suckers."

The questionnaires, reports of the physical examination by the otolaryngologist and pediatric allergist, and the result of the nasal smear inspection were examined to see if the data were consistent with a hypothesis that excess overjet was related to evidence of allergic nasal itching and to other characteristics. The data reported here are tested for statistical significance by the chi square test of association. A significant chi square value occurred with $P \leq 0.05$ and a highly significant value with $P \leq 0.01$.

RESULTS

Of the 319 children about whom information was obtained at the second interview, 39 had originally been found to have excess overjet. Digit sucking was three times as common in this group as in those with normal overjet, a highly significant association (Table I).

Table I. Relation between excess overjet and sucking the digits

Excess overjet	Digit sucking			
	Present		Absent	
	No.	%	No.	%
Present	17	26.9	22	8.6
Absent	46	73.1	234	91.4
Total	63	100.0	256	100.0
	Highly significant			

Table II. Relationship between allergic nasal itching and excess overjet in two groups, those who did and those who did not suck their digits

Excess overjet	Allergic itching							
	With digit sucking				Without digit sucking*			
	Present		Absent		Present		Absent	
	No.	%	No.	%	No.	%	No.	%
Present	12	40.0	5	15.2	11	8.3	11	9.0
Absent	18	60.0	28	84.8	121	91.7	111	91.0
Total	30	100.0	33	100.0	132	100.0	122	100.0
	Significant				Not significant			

*Nasal crease not recorded in two.

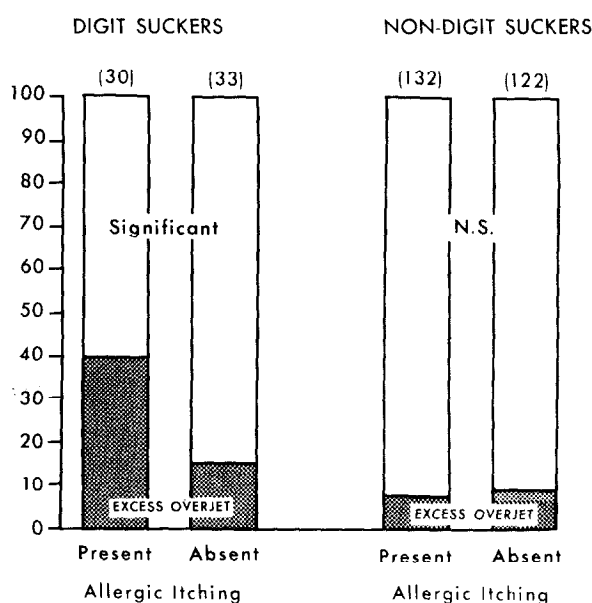


Fig. 3

The relationship between evidence of allergic nasal itching and excess overjet in two groups, those who did and those who did not suck their digits.

In the group who sucked their digits, evidence of allergic itching almost trebled the prevalence of excess overjet (Table II, Fig. 3). This is a statistically significant association. There was no significant increase of excess overjet in those who had evidence of allergic itching but did not suck their digits (Table II).

There was no significant association between excess overjet and the symptoms and signs of nasal allergy, either collectively or individually, except for the presence of a nasal crease. The presence of a nasal crease more than doubled the prevalence of excess overjet in children who sucked their digits (Table III). A nasal crease was found as often in those who sucked their digits as in those

Table III. Relationship between a nasal crease and excess overjet in two groups, those who did and those who did not suck their digits

<i>Excess overjet</i>	<i>Nasal crease*</i>							
	<i>With digit sucking</i>				<i>Without digit sucking*</i>			
	<i>Present</i>		<i>Absent</i>		<i>Present</i>		<i>Absent</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Present	9	47.4	8	18.2	9	11.4	13	7.4
Absent	10	52.6	36	81.8	70	88.6	162	92.6
Total	19	100.0	44	100.0	79	100.0	175	100.0
	Significant				Not significant			

*Nasal crease not recorded in two.

Table IV. Relation between a history of digit sucking and the presence of a nasal crease

<i>Digit sucking</i>	<i>Nasal crease*</i>			
	<i>Present</i>		<i>Absent</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Yes	19	19.4	44	20.00
No	79	80.6	175	80.0
Total	98	100.0	219	100.0
	Not significant			

*Nasal crease not recorded in two.

Table V. Relation between the history of a stuffed up nose or snorting and the finding of excess overjet in two groups, those who did and those who did not suck their digits

<i>Excess overjet</i>	<i>Stuffed nose or snorting</i>							
	<i>With digit sucking</i>				<i>Without digit sucking</i>			
	<i>Present</i>		<i>Absent</i>		<i>Present</i>		<i>Absent</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Present	5	25.0	12	27.9	6	7.1	16	9.3
Absent	15	75.0	31	72.1	78	92.9	156	90.7
Total	20	100.0	43	100.0	84	100.0	172	100.0
	Not significant				Not significant			

who did not suck their digits (Table IV). Stated another way, digit sucking was no more common in those with a nasal crease than in those without it.

Neither a history of a stuffed up or snorty nose (Table V) nor the findings of enlarged adenoids (Table VI) was associated with an increased prevalence of excess overjet.

The relationship between age and both excess overjet and sucking the digits was examined (Table VII). The over-all age distribution in this population is not representative of the age distribution of children in the Vancouver school

Table VI. *Relation between enlarged adenoids and excess overjet in two groups, those who did and those who did not suck their digits*

<i>Excess overjet</i>	<i>Enlarged adenoids*</i>							
	<i>With digit sucking</i>				<i>Without digit sucking</i>			
	<i>Present</i>		<i>Absent</i>		<i>Present</i>		<i>Absent</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
Yes	4	23.5	8	26.7	8	7.7	8	11.3
No	13	76.5	22	73.3	96	92.3	63	88.7
Total	17	100.0	30	100.0	104	100.0	71	100.0
	Not significant				Not significant			

*Adenoids not visualized in 87 children.

Table VII. *Relationship between age, excess overjet, and sucking the digits*

	<i>Age group (yrs.)</i>											
	<i>5-7</i>		<i>8</i>		<i>9</i>		<i>10</i>		<i>11-15</i>		<i>Total</i>	
	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>	<i>No.</i>	<i>%</i>
<i>Digit sucking</i>												
Present	18	28.6	8	12.7	15	23.8	13	20.6	9	14.3	63	100.0
Absent	87	34.0	37	14.5	37	14.4	41	16.0	54	21.1	256	100.0
<i>Excess overjet</i>												
Present	6	15.4	10	25.6	7	17.9	12	30.8	4	10.3	39	100.0
Absent	99	35.4	35	12.5	45	16.1	42	15.0	59	21.1	280	100.0
Total	105	32.9	45	14.1	52	16.3	54	16.9	63	19.7	319	100.0

Association between digit sucking and age, not significant; association between excess overjet and age, highly significant.

system, because these children were selected for another study of hearing loss.⁵ Nevertheless, if it is assumed that there is no relationship between hearing loss and these parameters, it can be presumed that there should be no relationship between age and digit sucking. This was in fact found. Table VII, however, does show a significant relationship between age and the presence of excess overjet. This is as expected, and there is a deficiency of the younger and older age groups in those with excess overjet.

A series of analyses were then conducted to see if the significant associations found in Tables I, II, and III could be explained by age differences. No such age effect was found.

DISCUSSION

Digit sucking is generally accepted as an important cause of excess overjet^{7, 8}; our study confirms the strong association between these two findings.

Mouth breathing is also recognized as a frequent cause of excess overjet.^{7, 8} Enlarged adenoids and allergic nasal obstruction are two common causes of mouth breathing and both are, for this reason, thought to result in excess

overjet.⁸ However, in our study, neither enlarged adenoids nor a history of nasal obstruction was associated with an increased prevalence of excess overjet, either in the whole group of children or in those who sucked their digits.

We propose that allergic itching of the palate may be a stimulus for increased digit sucking, resulting in a greater prevalence of excess overjet. Children who suck their digits, in the present study, have an almost trebled prevalence of excess overjet if they have allergic itching of the nose, as evidenced by nose rubbing, a nasal crease, or a nasal secretion eosinophilia.

The palate, as well as the nose, may itch in allergic rhinitis.⁴ We postulate that the allergic child may relieve itching of the nose by rubbing its tip upward, producing a nasal crease, and may relieve itching of the palate by increased digit sucking, thereby pushing out the upper relative to the lower incisors.

It should be noted that children who have evidence of allergic itching but do not suck their digits have no increase in excess overjet. Thus it appears that itching does not cause excess overjet on its own. Rather, it seems that itching is a stimulus for increased digit sucking in a child who already sucks his digits.

In children who sucked their digits, there was a significant association between a nasal crease and excess overjet which was not due to the age of the child. A nasal crease is a common finding in children with allergic rhinitis³ and appears to be a useful indication of chronic nasal itching. In the present study, there was a significant association between a history of prolonged nasal itching or nose rubbing and the finding of a nasal crease on examination.

A nasal crease is apparently not produced by merely touching the nose with the fingers, as may be observed when a child sucks his thumb. A nasal crease was found as often in those who did not suck their digits as in those who did.

It is possible that the pediatric allergist was prejudiced in his decision as to whether excess overjet was present. He first inspected the nose for a crease and then looked at the teeth. However, he did not know whether the child sucked his digits; this information was not available until one year later. If prejudice accounted for the large increase in excess overjet when a nasal crease was present, the increase would not have been confined to those who sucked their digits, as was the case.

No other symptom or sign of nasal allergy increased the prevalence of excess overjet significantly. Only evidence of nasal itching appeared to have this effect.

Although the sample of children in this study was not a probability sample, there is no reason to expect a strong bias which would influence the above inductive reasoning. The original sample⁵ comprised children who were found to have deafness matched for age, sex, number of siblings, and, in a limited way, social class and residential location. The pooling of both groups does result in distortion of the sample according to these matching characteristics. Nonetheless, while deafness due to secretory otitis media was shown to be associated with both enlargement of the adenoids and a carefully defined form of nasal allergy,⁶ no association was observed with nose rubbing, nasal crease, or nasal eosinophilia, the important variables in this study of excess overjet; i.e., there was no apparent selection favoring these variables. Further, although an association was found between the presence of excess overjet and age, this association did not explain the relationships described in this paper.

CONCLUSION

Digit sucking is clearly associated with excess overjet, a relationship which is probably causal. Further, it can be proposed from the present study that children with this habit may, if they have allergic rhinitis, relieve itching of the palate by increased digit sucking, resulting in more excess overjet. Although the numbers are small, the data suggest that digit sucking alone doubles the prevalence of excess overjet, while digit sucking in the presence of allergic itching increases the prevalence about five times. The presence of a nasal crease appears to be a sign of chronic itching of the nose, and it may be indirect evidence of itching of the palate. Thus a nasal crease in a child who sucks his thumb or fingers may be an indication for investigation of allergic factors, particularly if excess overjet is already present.

We wish to thank Dr. Gayton, Vancouver Medical Officer of Health, and his staff for their valued cooperation; the principals of the schools which were visited for giving us access to their pupils; Margaret Murray, A.B., for examining the nasal smears, and Brenda Morrison, M.A., for statistical aid; Dr. C. S. Lear of the Faculty of Dentistry for advice on orthodontic terminology; and our colleagues, Doctors G. C. Robinson, K. G. Cambon, and H. Moghadam who helped with the project.

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