



Letters

Association of oral habits with food allergy and comorbid atopic disease

Food allergies are a potentially life-threatening condition that strongly affect quality of life.¹ Many studies are investigating the effect of various environmental factors on the development of food allergy. The hygiene hypothesis theorizes that increased cleanliness in recent decades has decreased microbial exposures during early childhood, which may suppress natural immune system development and increase the risk of allergic disease.² Environmental factors may increase the microbial or antigen exposure to young children, thus altering their risk of atopic disease. In particular, oral habits may have a role in the development of atopic disease. Infants of parents who suck on their pacifiers to “clean” them are less likely to experience asthma, eczema, or allergic sensitization. It is postulated that by parents “cleaning” the pacifier by sucking on it, they transfer microbes to the infant, thus stimulating the infant’s immune response.³ Lynch et al examined the association between allergic disease and thumbsucking and nail biting. Children with a habit of thumbsucking or nail biting were less likely to experience atopic sensitization. There was no association between thumb-sucking or nail biting with hay fever or asthma.⁴ The study did not examine the relationship between oral habits and food allergy. This study aimed to examine the relationship between food allergy and oral habits, such as nail biting, thumbsucking, and chewing on objects.

The research protocol was approved by the Research Subjects Review Board at the University of Rochester Medical Center. Subjects included in the study were children aged 10 years or younger with a history of eczema. Subjects were recruited at the Pediatric Allergy and Immunology Clinic at Golisano Children’s Hospital (Rochester, New York) in 2017. Parents filled out study questionnaires about the child’s oral habits, including object chewing, nail biting, and thumbsucking. The survey asked about each oral habit in the last year, and parents selected between “certainly,” “somewhat,” or “no.” Subjects were considered to have oral habits if “certainly” or “somewhat” were selected. Anonymous questionnaires also included information about physician-diagnosed asthma, allergic rhinitis, and food allergies in addition to family history and environmental history.

Statistical analyses were performed using version 9.4 of the SAS System for Windows (SAS Institute Inc., Cary, North Carolina). Subject and parent characteristics were compared among children with and those without oral habits. Comparisons on continuous

variables were analyzed using the *t* test or the Wilcoxon rank sum test (if non-normally distributed), and those on categorical variables were analyzed using χ^2 test or Fisher’s exact test. Multiple logistic regression analysis was performed to evaluate the association between food allergy and thumbsucking, object chewing, or nail biting after adjusting for age, smoke exposure, pet exposure, breastfeeding, and parental food allergies. All tests were two sided, and $P < .05$ was considered statistically significant.

A total of 104 subjects were recruited and included in this analysis. Of the 104 children, 66 (63%) had an oral habit (thumb-sucking, nail biting, or object chewing). Table 1 indicates the baseline characteristics in the groups with and without oral habits. More than 44% of the children had food allergy. Oral habits were significantly associated with food allergy (odds ratio [OR] = 10.9; 95% CI, 3.5–34.5; $P < .0001$) and were inversely associated with asthma (OR = 0.27; 95% CI, 0.084–0.86; $P = .027$) even after logistical regression analysis adjusting for confounding variables of breastfeeding, parental food allergies, smoke exposure, age, and pet exposure. Both associations remained significant ($P < .05$) when the data were analyzed separately for subjects aged 2 years or older (data not indicated). There was no significant association between oral habits and allergic rhinitis.

In this population of children with a diagnosis of eczema, children with oral habits appeared to be at higher risk for food allergy and lower risk for asthma with no effect on allergic rhinitis. To the best of our knowledge, this is the first study to examine the relationship between oral habits and food allergy. One previous study found that children with oral habits have a lower risk of experiencing atopic sensitization⁴; however, the study population was a birth cohort that was not limited to high-risk children for atopy or those with existing eczema.

Contrary to our initial hypothesis that oral habits might have a protective effect in the development of food allergy by introducing food allergens to the gastrointestinal tract, thus promoting tolerance rather than sensitization, children with oral habits were at higher risk for food allergy. The benefit of exposure to food antigens orally may be compromised by the relatively small amount of antigen available by such means, and the environmental burden of food protein exposure through skin may outweigh any potential benefit resulting from exposure through oral habits.⁵ It is possible that if these children had eczematous patches around their lips or cheeks, oral habits may promote the introduction of food allergens transcutaneously, thus promoting sensitization rather than tolerance development. Furthermore, children who frequently suck their thumbs would be more likely to experience eczema on their hands, further introducing food allergens through inflamed skin. Their saliva may further disturb the skin barrier and promote the introduction of allergens through the skin.

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Table 1
Demographics of the Whole Study Population

Characteristics	Any oral habit n (%)	No oral habit n (%)	P value
Age, mean (SD)	3.7 (2.8)	4.2 (3.4)	.81
Breastfed	46 (72)	24 (65)	.46
Parental food allergy	25 (38)	11 (29)	.36
Smoke exposure	12 (18)	4 (11)	.31
Pet exposure	51 (77)	20 (53)	.01
Food allergy	40 (61)	6 (16)	OR = 10.9; 95% CI, 3.5–34.5; P < .0001
Asthma	22 (33)	18 (47)	OR = 0.27; 95% CI, 0.084–0.86; P = .027
Allergic rhinitis	29 (45)	18 (47)	OR = 0.47; 95% CI, 0.12–1.8; P = .28

Abbreviations: CI, confidence interval; OR, odds ratio.

NOTE. Wilcoxon rank sum test was used to compare continuous variables, such as age; Pearson's χ^2 test was used to compare the categorical variables. Multiple logistic regression analysis was performed to evaluate the association between food allergy, asthma, and allergic rhinitis with oral habits after adjusting for age, smoke exposure, pet exposure, breastfeeding, and parental food allergies (**in bold**).

The limitations of this study include risk of recall bias, use of parental report of food allergy, and limited generalizability to the general population. Inherent to the inclusion criteria and recruitment in a pediatric allergy clinic, subjects were at a higher risk for atopic disease; therefore, there was selection bias. All children had a history of eczema; however, we did not acquire data on the severity or distribution of the eczema or whether this differed between children with and those without food allergies.

This pilot study found a significant association between oral habits and the risk for food allergy in a population of children with eczema. Oral habits are common in children and they pose as a risk factor for the development of food allergy. This pilot study lays the groundwork for future efforts to assess whether the risk for food allergy from oral habits would be magnified in specific circumstances, such as in children with facial eczema or in those without eczema.

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