cause naive T cells to differentiate to T-helper 2 phenotypes (allergy promoting), at this time the findings of this study are associational and not causal. There are numerous confounding factors that may have resulted in the observed associations. The authors proposed that there may have been cultural biases in diagnosis. It is also unusual that this association only held for vitamin use at 3 and 6 months of age but not at 3 years of age. It was noted that formula-fed infants who received (but did not need) multivitamins were at higher risk of food allergy than breastfed infants who received multivitamins. The authors could not evaluate the possibility that formula-fed infants were given multivitamins, because they had illnesses (such as atopic dermatitis or food allergy) that may have led to such interventions. The authors also indicated that it is possible that persons inclined to use multivitamins are also persons who are more likely to report their child’s health problems or seek more medical diagnoses for their child’s symptoms. Last, these data were collected ~15 years ago, and since then the rates of asthma and food allergy have apparently increased significantly. It is not clear that the results would be similar today. The numerous potential confounding influences in this study require that the results be confirmed in other studies before any specific recommendations can be made.

Christopher Randolph, MD
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ENDOTOXIN EXPOSURE AND ECZEMA IN THE FIRST YEAR OF LIFE


Purpose of the Study. To examine the relationship between endotoxin exposure early in life and eczema during the first year of life in children with parental history of asthma or allergy.

Study Population. A birth cohort of children in metropolitan Boston, Massachusetts, selected for a history of allergy or asthma in at least 1 parent.

Methods. A total of 505 infants from 499 Boston families were enrolled between September 1994 and August 1996 and followed prospectively. Seven children followed for ≤4 months were excluded from analysis. Adequate analysis of endotoxin was obtained from house dust sampled from 401 living rooms. Endotoxin exposure was categorized into quartiles by concentration of endotoxin units per milligram of house dust (EU/mg). Potential predictors of eczema and confounders were considered for multivariate analysis including socioeconomic data, birth weight, maternal age, season of birth, breastfeeding, ingestion of allergenic foods, family history of atopic diseases, pets in the home, and day care. Maternal serum was analyzed for allergen-specific IgE to several common allergens. Every 2 months the primary caregiver was asked, “Has a doctor or nurse ever said that your child has eczema?”

Results. Of the 498 children, 140 (28%) had eczema in the first year of life. Exposure to high levels of endotoxin (80.48–713.2 EU/mg) at 2 to 3 months of age were inversely associated with eczema during that time. For every quartile increase in endotoxin measured in living room house dust, there was a decrease in the odds of developing eczema in the first year of life (odds ratio [OR] for each quartile increment: 0.76). Exposure to a dog in the home at 2 to 3 months of life compared with no dog exposure decreased the odds of having eczema in the first year of life by half; however, this association became less significant when adjusted for endotoxin exposure. In the multivariate analyses, paternal history of eczema (OR: 1.91) and maternal sensitization to at least 1 allergen (OR: 1.61) were associated with developing eczema.

Conclusions. In children with parental history of asthma or allergy, exposure to high levels of endotoxin at 2 to 3 months of age may protect against eczema development in the first year of life. Additionally, both paternal history of eczema and maternal sensitization to ≥1 allergen are associated with increased risk of eczema in the first year of life.

Reviewer’s Comments. A great deal of faith has been placed in the “hygiene hypothesis” being correct despite relatively few prospective birth cohort evaluations. Although previous studies have focused on allergic sensitization, cytokine production, and development of asthma, this study makes an association between endotoxin levels in the living rooms (but not bedrooms) of children’s homes and the development of eczema in the first year of life. This lends another facet, and end-organ effect, to support the argument to validate the hygiene hypothesis. Additional data from this and other high-risk birth cohorts will provide additional data to fuel this debate.

Mark H. Moss, MD
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PERTUSSIS VACCINATION IN INFANCY AND ASTHMA OR ALLERGY IN LATER CHILDHOOD: BIRTH COHORT STUDY


Purpose of the Study. To examine the association of pertussis vaccination in infancy to asthma or atopy by the age of 7.5 years.


Methods. Vaccination status for each child from the child health surveillance was obtained. Children were categorized as fully vaccinated (primary course of diphtheria, tetanus, and pertussis vaccines), partially vaccinated (completed primary course of diphtheria and tetanus vaccines but did not receive pertussis vaccine), or nonvaccinated. Wheeze outcomes were parental report of asthma at age 69 to 81 months, wheeze with whistling in the chest at age 69 to 81 months, and asthma diagnosed by a doctor at 91 months. A positive outcome of atopy was defined by any positive allergy skin tests at 7 years old. Multivariable logistic regression was used to evaluate associations between immunization status and asthma and allergy outcomes.

Results. Vaccination history was available for 13 810 children: 13 109 (94.9%) were fully vaccinated, and 1446 did not have pertussis vaccination (340 nonvaccinated; 106 partially vaccinated). Prevalence of reported asthma at age 69 to 81 months was 12.4%, reported wheeze with whistling at 69 to 81 months was 9.8%, and atopy at 7 years was 20.5%. Unadjusted analyses showed significant associations between partial vaccination and asthma at age 69 to 81 months (odds ratio [OR]: 2.84; 95% confidence interval [CI]: 1.24, 6.53) and doctor-diagnosed asthma (OR: 3.03; 95% CI: 1.51, 6.09), but these associations did not remain in multivariate analysis. In multivariate analyses, there were no significant associations between the vaccinated categories and any of the outcomes.

Conclusion. There is lack of an independent association between pertussis vaccination in infancy and inactivated,
whole-cell vaccine and the subsequent development of asthma or atopy during later childhood.

Reviewers’ Comments. This is a nice study evaluating whether there is an association between pertussis vaccination in infancy and the development of asthma or allergy in a large birth cohort. The lack of association by multivariate analysis agrees with some of the more recent studies that have looked at cross-sectional or earlier childhood outcomes. The results of this study in older children are encouraging and provide additional evidence that the benefits of vaccination far outweigh any risks.

WANDA PHIPATANAKUL, MD, MS
Boston, MA

NO EPIDEMIOLOGICAL EVIDENCE FOR INFANT VACCINATION TO CAUSE ALLERGIC DISEASE


Purpose of the Study. Because the prevalence of allergic disease has increased in the last decades and one theory for the increase is immune dysregulation associated with hygiene and reduced infection, the study sought to determine if healthy children vaccinated at an early age have an increased risk for the development of allergic disease.

Methods. Epidemiologic studies with original data on the correlation between vaccination with diphtheria, pertussis, tetanus (DPT), measles, mumps, rubella (MMR), and bacille Calmette-Guérin (BCG) immunizations in infancy and the development of allergic diseases were selected and reviewed for their quality and validity. To increase the likelihood of considering all relevant literature, Medline searches (from January 1966 to March 2003) were performed, bibliographic lists from retrieved articles were reviewed, and experts in the field were asked to identify relevant articles.

Results. Methodologic design and quality varied markedly between the studies reviewed. Ethical issues regarding vaccination precluded randomized, controlled trials (only 1 such study was found). Many studies did not address possible confounders such as the presence of lifestyle factors, which resulted in bias. The studies offering stronger evidence indicate that the investigated infant vaccinations do not increase the risk of developing allergic disease. Furthermore, BCG does not seem to reduce the risk of allergies.

Conclusions. The authors concluded that the reviewed epidemiologic evidence indicates that current infant vaccines do not cause allergic diseases.

Reviewers’ Comments. In an effort to reduce the risk of development of allergies, families knowledgeable about the “hygiene hypothesis” sometimes worry that vaccination of their children will increase the risk of allergic disease. Although most pediatricians can easily point out that vaccination carries clear advantages for their use and that a concern for allergy would not be a good reason to defer immunization, this analysis of available data additionally supports the argument that there is no evidence to indicate that childhood vaccinations are the cause of the increase in allergic disease in Westernized countries. There is likely a complex interplay of environmental factors contributing to the apparent skewing toward an allergic, or T-helper 2–dominant, immune response and the resulting increased prevalence of atopic disease.

ALLERGENS AND ENVIRONMENTAL EXPOSURES

DOG ALLERGEN (Can f 1) AND CAT ALLERGEN (Fel d 1) IN US HOMES: RESULTS FROM THE NATIONAL SURVEY OF LEAD AND ALLERGENS IN HOUSING


Purpose of the Study. To estimate the levels of dog and cat allergens in US homes and provide the characteristics of households associated with these allergens.

Study Population. A total of 2456 individuals from 831 permanently occupied, noninstitutional housing units in 75 US locations that permit resident children.

Methods. Data for this study were obtained from the National Survey of Lead and Allergens in Housing conducted by the National Institute of Environmental Health Sciences and the US Department of Housing and Urban Development from 1998 to 1999. Vacuum-collected dust samples from a bedroom floor, bed, living room floor, living room sofa, or equivalent piece of upholstered living room furniture were analyzed for concentrations of primary dog allergen (Can f1) and primary cat allergen (Fel d1) in micrograms of allergen per gram of dust by using monoclonal antibody enzyme-linked immunosorbent assays. Housing and household characteristics were determined by questionnaire or observation. Bivariate associations between housing characteristics and the presence of an indoor dog and cat were examined.

Results. At the time of the survey, 55% had no cat or dog in the home for the past 6 months, 10% had both a cat and a dog, 21% had at least 1 cat and no dog, and 13% had at least 1 cat and no dog. The percentage of homes with an indoor dog was higher if they were outside of the Northeast US, were a single family, owned versus rented, had >1 occupant, had an income greater than $20,000.00 per year, and were white. The percentage of homes with an indoor cat was higher if they were in the Northeast or West or were white. A greater concentration of Can f1 was associated with single-family homes with >1 occupant, higher income levels, white race, and forced-air heating and air conditioning and presence of an indoor cat or dog. For Fel d1, a higher geometric mean concentration was associated with living in the West, being white, having an education above the high school level, and presence of an indoor dog or cat. The presence or absence of a cat had the greatest influence. Respectively, Can f1 and Fel d1 were detectable in 93.8% and 96.6% of beds, 95.6% and 96.9% of bedroom floors, 94.9% and 96.1% of living room floors, and 98% and 97.9% of sofas. Of the 97.7% of homes with detectable antigen, 99.9% had detectable Can f1 in at least 1 sample location. Of the 99% of homes with detectable antigen, 100% had detectable Fel d1 in at least 1 sample location. For Can f1 and Fel d1, 55.7% and 66% of US homes exceeded previously published sensitization threshold levels of >1 and >1 μg/g, respectively. Additionally, 34.9% and 34.7% of US homes exceeded the asthma-symptoms threshold for Can f1 and Fel d1.

Conclusions. Can f1 and Fel d1 are ubiquitous allergens in US homes. Levels associated with both sensitization and exacerbation of asthma are found even in homes without cats or dogs. Demographic groups associated with greater likelihood of pet ownership implicate the role of the community as a source of the allergens.

Reviewers’ Comments. This study demonstrates the need for greater consideration of the role of dog and cat allergens in both the sensitization and symptom exacerba-
Pertussis Vaccination in Infancy and Asthma or Allergy in Later Childhood: Birth Cohort Study
Wanda Phipatanakul
Pediatrics 2005;116;541
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