

Month of Birth and Sensitization to Dust Mites in New England

John A. Saryan, M.D., and Athanasios Bouras, M.D.

ABSTRACT

Charts from 908 patients born in New England and seen at the Lahey Clinic because of allergic rhinitis or asthma or both were reviewed to ascertain whether or not a relationship existed between month of birth and subsequent development of allergy to house dust mites. Prick/puncture and intradermal skin tests for aeroallergens were performed on all patients. Skin tests for *Dermatophagoides farinae* (Df) mite were scored very positive (VP) in 451 patients (49.7%), mildly positive (MP) in 234 patients (25.7%), and negative (NEG) in 223 patients (24.6%). No discernible difference in frequency of birth could be identified for any single month for either Df-sensitive or Df-negative patients. Comparisons of 4-month periods (May through August, September through December, and January through April) failed to show a seasonal predilection for month of birth. During the 6-month period of February through July, a slight difference was observed for the overall group of 908 patients: 240 of the VP patients (53.2%), 111 of the MP patients (47.4%), and 105 of the NEG patients (47.1%) were born within this period compared with 211 VP patients (46.8%), 123 MP patients (52.6%), and 118 NEG patients (52.9%) who were born within the period of August through January. The difference among the groups was not statistically different ($P = 0.20$). Of the 225 children and adolescents who were either VP or MP, 125 patients (55.6%) were born within the period of February through July; of the 83 children and adolescents who were NEG, 37 patients (44.6%) were born within that same period. Although dust-mite allergic patients and, in

particular, children and adolescents with asthma or rhinitis or both tended to be born within the period of February through July, no clear-cut statistically significant predilection in month of birth or season could be identified for New England-born adult or pediatric mite-allergic patients with rhinitis or asthma or both. (Allergy and Asthma Proc 17: 65–69, 1996)

The first few months of life are a vulnerable period to the newborn because it is during this time that exposure to inhaled allergens may lead to early sensitization. Some studies^{1–10} have supported the hypothesis that early exposure to pollen or mite allergens or both in infancy may predispose the individual to allergen-specific sensitization or confer an increased risk of the development of asthma or rhinitis. Other studies^{11–13} have not shown this correlation. Korsgaard and Dahl³ found that mite-sensitive patients with asthma or rhinitis or both who were living in Denmark were more likely to be born between May and September. Warner and Price¹⁰ noted that mite-sensitive patients with asthma in London were more likely to be born between July and December. In a study⁹ of 400 patients, we previously demonstrated a statistically significant increase in incidence of birth for the month of August and for the 6-month period of March through August for ragweed-sensitive patients born in New England. House dust mite is a potent environmental allergen in many parts of the world, including New England, and is responsible for causing asthma, rhinitis, and atopic dermatitis.¹⁴ Although it is a perennial allergen, distinct seasonal fluctuations in levels of mite allergen in house dust have been shown to occur in temperate climates.¹⁵ We surveyed a large number of patients with allergic rhinitis or asthma or both to see if a seasonal pattern of birth was present for dust-mite-sensitive patients who were born in New England. If such a correlation could be demonstrated, the implementation of strict measures for the control of dust mites in the bedrooms of infants of atopic parents might be considered for children born during high-risk months, and birth planning could be considered by

From the Department of Allergy and Immunology, Lahey Hitchcock Medical Center, Burlington, MA

Dr. Bouras is currently with the Pulmonary Division of the Department of Medicine, Somerville Hospital, Somerville, MA 02143
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Address correspondence and reprint requests to John A. Saryan, M.D., Department of Allergy and Immunology, Lahey Hitchcock Medical Center, 41 Mall Road, Burlington, MA 01805

parents in an effort to reduce the likelihood of future sensitization to mites in their offspring.

PATIENTS AND METHODS

Included in the study were 908 patients who had been followed-up in the Department of Allergy and Immunology at Lahey Clinic for allergic rhinitis or asthma or both. The age range was from 5 years through 79 years. Charts were reviewed to ascertain place of birth so that patients born outside New England would be excluded from study. Some patients lived outside of New England for varying periods of time. Patient information, clinical diagnoses, and the results of skin testing were recorded for each patient. Most of the patients had multiple sensitivities. Patients enrolled in the study were tested with a battery of common seasonal and perennial aeroallergens by both the prick/puncture and intradermal methods and were separated into three groups based on skin test reactivity. Patients whose prick/puncture test was 3+ or greater (wheal > 6 mm in the longest diameter with erythema > 20 mm) were classified as very positive (VP). Patients whose prick/puncture test was judged 2+ (wheal 3–6 mm with erythema > 20 mm) or who tested positive by intradermal testing (wheal > 5 mm with erythema > 20 mm) were classified as mildly positive (MP). Patients with an absent or equivocal response on both prick/puncture and intradermal skin tests were considered negative (NEG).

Dermatophagoides farinae (Df) mite extract was purchased from Miles Inc. (Spokane, Washington). Before 1990, the extract was used in a concentration of 1:50 (weight:volume) for prick/puncture testing and 500 PNU/mL for intradermal testing. During and after 1990, Df extract was used in a concentration of 30,000 Allergy U/mL for prick/puncture and 300 Allergy U/mL for intradermal testing. Statistical analysis of the data was performed by chi-squared analysis. Results were considered statistically significant if the *P* value was < 0.05.

RESULTS

Characteristics of the patients are shown in Table I. Of the 908 patients, 490 were female and 418 were male. A total of 685 patients (75.4%) were sensitive to Df (451 patients (49.7%) were VP and 234 patients (25.8%) were MP), and 223 patients (24.6%) tested NEG. Mean ages for

the three groups were 27.1 years for the VP group, 34.7 years for the MP group, and 29.6 years for the NEG group.

The distribution of months of birth of patients in all three groups is shown in Table II. Although the month of June showed the largest difference among the groups, no single month showed a significant difference. In the VP group, 45 patients (10.0%) were born in June compared with 19 patients (8.1%) in the MP group and 13 patients (5.8%) in the NEG group. The difference among the groups was statistically insignificant (*P* = 0.19). A tendency for birth during the period of February through July was seen for Df-mite VP patients compared with the NEG group: 240 of the VP patients (53.2%) were born during this period compared with 105 (47.1%) of the NEG group (Fig. 1) and 111 of the MP patients (47.4%). The differences were not statistically significant (*P* = 0.20). When the 4-month periods of May through August, September through December, and January through April were compared, only the May through August group of MP patients (but not the VP group) showed an apparent difference in frequency of birth month. During the period of May through August, 155 VP patients (34.3%), 94 MP patients (40.2%), and 75 NEG patients (33.6%) were born. From September through December, 147 of the VP patients (32.6%), 74 of the MP patients (31.6%), and 80 of the NEG patients (35.9%) were born. During the months of January through April, 149 of the VP patients (33.0%), 66 of the MP patients (28.2%), and 68 of the NEG patients (30.5%) were born. The differences were not statistically significant (*P* = 0.45).

In the group of 308 children and adolescents (ages, 5 to 17 years), the differences were more apparent (Table III) but not statistically significant. When both VP and MP groups were combined, 125 Df-positive patients (55.6%) were born during the 6-month period of February through July compared with 37 of the NEG patients (44.6%) born during the same period (Fig. 1). The differences were not statistically significant (*P* = 0.11); however, with the sample size used, the power of determining statistical significance was only 35%. To reach a power of 80% would have required a total of 864 patients.

DISCUSSION

Asthma and allergic rhinitis are among the most common chronic diseases. Furthermore, the prevalence of asthma appears to be increasing. Both genetic as well as

TABLE I
Characteristics of Study Patients

	Skin-test Reactivity to Df Mite			Total
	Very Positive	Mildly Positive	Negative	
Number of patients	451 (49.7%)	234 (25.8%)	223 (24.6%)	908
Males	211	108	99	418
Females	240	126	124	490
Mean age (years)	27.1	34.7	29.6	29.7

TABLE II

Distribution of Patients by Month of Birth Compared with Skin Test Reaction to Df-Mite Extract

Skin Test Group	Month of Birth												All
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Df VP	30	41	41	37	39	45	37	34	34	41	32	40	451
Df MP	17	17	13	19	23	19	20	32	17	25	15	17	234
Df NEG	13	16	19	20	18	13	19	25	19	20	20	21	223

Df VP = Results of Df-mite skin test were very positive; *Df MP* = Results of Df-mite skin test were mildly positive; *Df NEG* = Results of Df-mite skin test were negative.

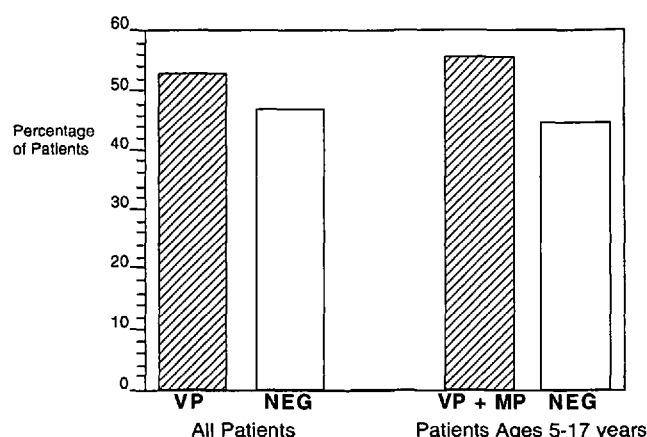


Figure 1. Graph shows comparison of months of birth for mite-sensitive (VP or VP and MP) and nonsensitive (NEG) patients born during the period of February through July.

environmental factors appear to be involved in the development of allergic sensitization. Prospective parents often inquire about the risk of the development of asthma or allergies in offspring and about measures that can be taken to reduce such risk. In families in which both parents had allergic disease, 42% of children developed allergic disorders by 18 months of life, which was double the incidence encountered when only one parent had a history of allergy.¹⁶ Attempts have been made at predicting the development of asthma or allergic rhinitis in healthy subjects.^{5,17,18}

Studies^{1-13,17,19} have shown conflicting evidence concerning the role of the month of birth and subsequent sensitization to allergens. These differences may be attributable to several factors, including different disease groups, geographic factors, varying age ranges, variable methods used, and different allergens studied. In 1976, Soothill et al.²⁰ showed that the risk of development of allergic sensitization to mites in infants up to one year of age was dependent on the season of birth. In an 11-year prospective study of 67 children in England, Sporik et al.¹⁷ found that high exposure to levels of dust-mite allergen in the first year of life was a major risk factor for the development of asthma and sensitization to mites in children who had at least one parent who was allergic. Arshad et al.²¹ carried out a pro-

spective study in the United Kingdom of 120 neonates with strong family histories of allergy and found that neonates who were protected from contact with dust mites had a reduced frequency of allergic disorders by the end of the first year of life. These studies support the theory that neonatal exposure to allergens may be one very important factor in predisposing the genetically susceptible newborn to the later development of respiratory allergy.

Infants up to 6 to 12 months of age and especially up to 3 months of age are considered to be especially vulnerable to sensitization because of the immaturity of the immune system at that early age. It has been postulated^{3,20} that a transient deficiency of IgA might render the newborn more susceptible to IgE-mediated sensitization. Therefore, heavy exposure to an allergen such as pollen in early life may sensitize the newborn and lead to respiratory allergy later in life.^{1-6,9}

The present study showed a nonstatistically significant difference in the seasonal occurrence of birth in patients and especially children who were allergic to dust mites. Korsgaard and Dahl³ studied 240 adult patients with asthma and allergic rhinitis and found that patients who tested positive to dust mites on skin tests were born in greater frequency in the months of May through September. This finding was attributed to higher concentrations of dust mites in the indoor environment during that season. Smith and Springett² found a positive relationship between season of birth and sensitivity to mites in a study of 1286 asthmatic children: 56.2% of mite-allergic children in this study were born during May through October compared with 46.6% of children with asthma who were not allergic to mites. This difference was greater than what would be expected in the general population.

A few studies^{6,13} have failed to show a correlation between risk of sensitization to specific allergens and month of birth. Schäfer et al.¹³ investigated a population of 1,066 preschool children (ages, 5 to 6 years) in Bavaria, Germany. Skin tests were performed on these children, and results did not show a predilection in birth month in mite-sensitive children.¹³ Kemp⁶ also found a negative correlation between month of birth and hypersensitivity to house dust mite in Australian children who were 3 to 14 years of age;

TABLE III

Distribution of 308 Children and Adolescents by Month of Birth Compared with Skin Test Reaction to Df Mite

Skin Test Group	Month of Birth												All
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Df VP + MP	13	23	20	20	20	19	23	17	14	22	17	17	225
Df NEG	6	8	6	8	4	3	8	7	7	2	14	10	83

Df VP + MP = Results of Df-mite skin test were very positive and mildly positive; Df NEG = Results of Df-mite skin test were negative.

however, this study included only 86 children with positive skin tests, and no controls were used.

The present study demonstrates a small seasonal predilection in birth month for our combined adult and pediatric population of dust-mite sensitive patients with asthma and allergic rhinitis. A greater trend was seen in the 308 children (ages, 5 to 17 years) who were born during the period of February through July. Neither difference reached statistical significance. A larger sampling of allergic children, including more negative controls, might have confirmed the trend we observed.

In a large series of children and adolescents, Aberg¹⁹ found that month of birth most heavily influenced the onset of allergic rhinitis at 6 years of age and was not seen before 2 years or after 10 years of age. The age of the patient at the time of the study may be of particular importance and might explain the increased seasonal difference in month of birth for our younger patients.¹⁹ Cumulative exposure to environmental allergens may gradually lessen the influence of birth season until this correlation eventually disappears, possibly by the age of 18 to 20 years.^{1,3}

Our results for children and adolescents are similar to the findings of other groups, although differences in our climate might explain the varying results between our study and others in the seasonal distribution of birth month.^{2,10} Birth during the period of February through July would result in 3 months or more of exposure in the first 6 months of life during the period of April through September, which were the seasons noted in our previous studies^{22,23} to be the peak period of seasonal symptom flares in mite-sensitive patients living in New England. It was noted by Platts-Mills et al.,¹⁵ however, that levels of mite-allergen in the more moderate climate of central Virginia were highest in the months of August through December.

The findings in this study contrast somewhat with our earlier findings⁹ of a statistically significant predilection in season and month of birth in ragweed-sensitive patients. One potential reason for the difference might be the intensity and short duration of exposure to ragweed pollen compared with mite allergen; the latter is perennial but does show quantitative variation during different seasons of the year.¹⁵ Another possible explanation could be that patients had multiple sensitivities to pollens, molds, and animal

allergens. A predisposition in month of birth might be more apparent if younger patients who were exclusively mite-sensitive were analyzed independently.

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