

Respiratory allergy and month of birth

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Summary

A total of 476 patients with respiratory allergy were interviewed to establish whether the season of birth influenced the type of allergy experienced. Patients with perennial symptoms did not differ from the general population of the U.K. in the distribution of their months of birth. Patients with summer seasonal symptoms attributable to grass pollen sensitivity were more likely to have been born in December to February than in August to November. This trend was most significant in female patients who did not have associated perennial symptoms and who developed symptoms early in life. Other significant differences were also noted between groups of patients complaining of the same symptoms. More males than females had summer seasonal symptoms whereas more females than males had perennial symptoms. Patients who had both perennial symptoms and summer seasonal exacerbations had a higher incidence of a positive family history of atopy and developed symptoms earlier in life than those patients who had summer seasonal or perennial symptoms only.

Introduction

An inherited predisposition to develop allergic rhinitis, asthma and eczema as a group has been recognized for more than 50 years (Cooke & Vander Veer, 1916). More recently Marsh *et al.* (1973) have shown that the ability to produce high levels of IgE antibody against particular ragweed antigens may be controlled by genes linked to the major histocompatibility complex. Poor concordance in the development of allergic symptoms in some twin studies (Falliers, Cardoso & Bane 1971) and the changing incidence of allergic diseases in immigrant populations in Great Britain (Morrison Smith, 1976) demonstrate that environmental factors are also of importance in the development of symptoms. The delayed development of serum IgA levels in atopic children (Taylor *et al.*, 1973) has suggested that priming for the production of allergy could occur during an early phase of abnormal mucosal permeability to antigens.

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Such early post-natal experience could predispose to the subsequent development of allergy by a number of mechanisms. Either a general tendency to produce IgE antibody to all subsequently presented antigens might occur or the abnormal responsiveness might be restricted to antigens encountered during the early vulnerable period. Were the latter the case a different distribution of birth dates would be expected in allergic populations with seasonal as opposed to perennial symptoms. Here we report the results of a study in which the influence of the month of birth on clinically significant respiratory allergy was examined.

Patients and methods

Patients

Patients, 476, diagnosed as having respiratory allergy and seen at an allergy clinic in Manchester, England were included in the study. Patients born outside the U.K. and those in whom a causative allergen was not identified were excluded. All patients were seen by at least one of us. The identification of causative allergens was made by a physician assessment which included in each patient, a case history, examination and prick tests and, where clinically appropriate, provocation testing. The constitution of our patient group is summarized in Table 1.

Table 1.

Symptom group	No. of patients	Percentage positive family history*	Mean decade of onset of symptoms†
Perennial with seasonal exacerbations	150	72	1.84
Summer seasonal only	171	57	1.86
Perennial symptoms only	155	58	2.22
Total	476	62	1.91

Intergroup differences significant * $P < 0.025$ χ^2 test, † $P < 0.01$ analysis of variance.

Statistical methods

The month of birth distribution of groups was compared to that of the whole population of the country using a χ^2 goodness of fit test, the expected birth month distribution of the groups being calculated from the Registrar General's Statistical Review 1956–1971. The significance of differences in birth month distribution between patient groups with and without individual symptoms was examined using a 2×12 contingency test (χ^2). Analyses were performed on the data for whole groups and also on that for sub-groups divided according to sex, presence or absence of family history of atopy and decade of onset of symptoms.

Results

As expected, different sex ratios were seen in patients developing symptoms early in life compared with those whose disease became apparent late. More males than females presented in the first decade of life (M:F 1.36) although amongst the whole patient

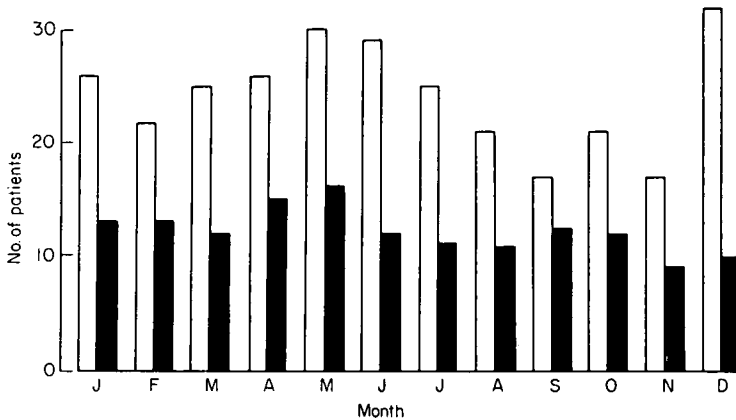


Fig. 1. Birth month distribution of all patients comparing those with and those without grass pollen induced symptoms. □, Grass pollen sensitive patients; ■, allergic patients without pollen sensitivity.

group there was a slight preponderance of females (M:F 0.93). In addition, the proportion of males to females differed between groups complaining of different symptoms. Rather more males than females complained of summer seasonal symptoms (M:F 1.08, $P < 0.05$) whereas more females than males had perennial symptoms (M:F 0.73, $P < 0.001$).

Neither the distribution of birth months of the total allergic population nor those of all males or all females taken separately differed significantly from that of the general population of the U.K. Fewer grass pollen sensitive patients were born in August, September, October and November than in other months, whereas the birth month distribution of patients without clinical pollen sensitivity is relatively flat (Fig. 1). However, the birth month distribution of neither group differed significantly from that of the general population. When patients with pollen induced symptoms who did not have perennial symptoms in addition are considered the apparent maldistribution of birth dates is more marked (Fig. 2). Twice as many patients with only summer

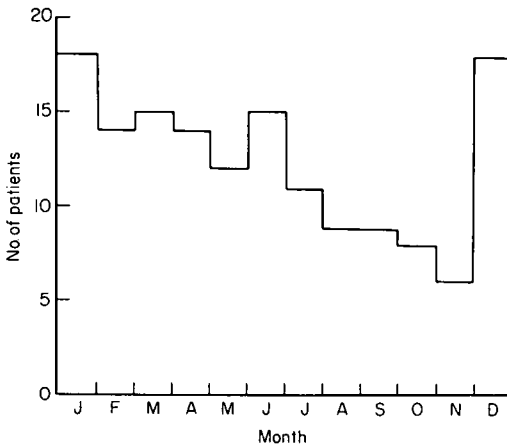


Fig. 2. Birth month distribution of patients with grass pollen induced symptoms who do not have associated perennial symptoms.

seasonal symptoms were born in December or January than in August, September, October or November. Although the birth month distribution of male pollen sensitive non-perennial sufferers does not differ significantly from that of the general population that of females does ($P < 0.01$). The birth month distribution of females with pollen sensitivity but without perennial symptoms is also significantly different from that of all females with perennial symptoms ($P < 0.01$). This pattern of birth dates with a December–February peak and August–November trough is most marked in female patients whose symptoms developed in the first three decades of life ($P = 0.003$), not being significant in patients developing symptoms after this time.

In patients with perennial symptoms either with or without summer seasonal exacerbations no significant differences in birth month distribution compared to the general population were found even when groups were sub-divided by sex, decade of onset of symptoms and presence or absence of a family history of atopy. No significant differences were observed between perennial sufferers who were considered to be *Dermatophagoides* spp. sensitive and those whose symptoms were related to other perennial allergens.

Discussion

Our results suggest that within an allergic population the symptom pattern is related to the season of birth. Allergic patients as a whole and patients having symptoms related to perennial allergens have a similar distribution of birth dates to the general population. Patients who are only clinically sensitive to grass pollen are more likely to have been born in the winter months than in the late summer or autumn. This pattern is most marked in females who develop symptoms in the first three decades of life, and only statistically significant by the tests used, amongst the female population. The statistical techniques applied here may be considered insensitive for the detection of significant differences in birth month distribution since no account is taken of the fact that months are consecutive. We considered other 'goodness of fit' tests which allow for the consecutive nature of the data which may be unreliable since the level of significance varied depending on which month is considered to start the year. Although Björkstén & Suoniemi (1976) have reported an abnormal birth month distribution amongst pollen sensitive patients in Finland, other studies have failed to demonstrate a relationship between season of birth and pollen sensitivity (Reed, 1958; Morrison Smith, 1970; Kleiner, Arkins & Lauwasser, 1975). Both Reed and Kleiner *et al.* studied much smaller groups than either Björkstén & Suoniemi or the present authors. In addition, Kleiner *et al.* defined their pollen sensitive patients by skin test whereas we used clinical sensitivity. Some of our patients considered not to be pollen sensitive by history and provocation testing had positive immediate skin tests to grass pollen, and similarly some patients without perennial symptoms had positive skin tests to *Dermatophagoides* spp. Morrison Smith did not observe an abnormal birth month distribution in a total group of 410 children with pollen allergy in the U.K. In our series the influence of season of birth was most evident in patients who had pollen allergy in the absence of other sensitivities. The explanation of this is obscure, but patients with multiple allergies might be considered to be a more easily sensitized population than those with a single clinical sensitivity. The influence of a single factor on the development of symptoms would therefore be expected to be more evident in the latter group. The observation that patients who have grass pollen sensitivity superimposed on perennial allergy develop symptoms earlier in life and have a higher incidence of a positive

family history of allergic disease than do patients with either summer seasonal or perennial symptoms alone supports the concept that the former belong to a more highly atopic population.

On the present evidence it is not possible to explain the mechanism by which the season of birth influences the nature of allergic symptoms. Our results do not provide positive evidence to support the hypothesis that sensitization to pollen occurs during a period of increased susceptibility in the first few months of extra-uterine life. It may be concluded that the development of clinical allergy in any individual is dependent upon genetic predisposition, sex and environmental factors, one of which appears to be the season of birth.

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