

Sensitivity to house dust mite and grass pollen in adults

Influence of the month of birth

J. KORSGAARD and R. DAHL

Department of Respiratory Diseases, Århus Kommunehospital, Århus, Denmark

(Received 13 April 1982; accepted for publication 11 December 1982)

Summary

A comparison was made between the birth month of a control population and a sample of 240 adult patients with bronchial asthma or rhinitis and positive skin test towards house dust mite (*Dermatophagoides pteronyssinus*). The patients were born more frequently ($P < 0.005$) in the summer and autumn months than in the other seasons. A similar comparison of 336 allergic patients with a positive skin test towards grass pollen (*Phleum pratense*) but no consistent seasonal preference in the birth months was revealed. This was possibly explained by the age of the patient group studied.

The increased incidence of house-dust mite allergy in patients born in the months of May to September inclusive when house dust mites are supposed to be most abundant corresponds to a relative risk of 1.44. It is important to diminish the exposure to house dust mites in early childhood because exposure to allergens may influence the development of allergic disease in later life.

Introduction

Development of allergic bronchial asthma or rhinitis is caused by hereditary factors and environmental conditions. Exposure to an allergen during the first 6 months of life seems to be of importance for the induction of allergen-specific IgE antibodies. In teenagers of 15–17 years of age a positive skin prick test to cat dander was not related to an actual exposure to cat, but related to the presence of a cat in the home during the first 6 months of life (Suoniemi, Björnstein & Haahtela, 1981). The purpose of the present study was to find out if high allergen exposure during the first months of life was associated with positive skin prick tests in adult patients with allergic bronchial asthma or rhinitis. Grass pollen (*Phleum pratense*) and house dust mite (*Dermatophagoides pteronyssinus*) were chosen as the allergens because of their importance as inhalation allergens.

Correspondence: Jens Korsgaard, Department of Respiratory Diseases, Århus Kommunehospital, DK-8000 Århus C, Denmark.

Patients and method

During the period from 1 January 1977 to 1 June 1981 a total of 1445 patients were referred for allergological investigation. Skin prick test was performed on all patients with sixteen common allergens. A positive skin reaction was equal to or larger than a control test with 0.1% histamine. The allergen extracts were produced and standardized by Allergological Laboratory, Copenhagen. In patients of 15–30 years of age a positive cutaneous reaction towards grass pollen or house dust mite was found in 456 cases. The birth months of these patients were recorded. The age group concerned was born in the years from 1947 to 1961. The distribution of birth month for the entire Danish population born in this time interval ($n = 1\,519\,358$) was given by the Danish Statistical Department. The number of patients expected to have a given birth month was calculated from this information. The ratio between the number of persons born in a given month and the total number of births ($n = 1\,519\,358$) times the number of patients was the number of patients expected to be born in that month.

Allergen exposure

In Denmark daily pollen measurements have shown the presence of grass pollen in the air during June and July (Sandberg, Weeke & Nüchel Petersen, 1982). At present the seasonal variation in the number of house dust mites in Danish homes is not known. In Holland a seasonal variation has been observed with the highest concentrations in the summer and autumn months (Voorhorst, Spijksma & Varekamp, 1969). In the U.S.A. the occurrence of house dust mites showed a similar maximum in June or September (Murray & Zuk, 1979). The time from the beginning of May to the end of September was therefore chosen as the season where the Danish population are exposed to the highest concentrations of house dust mite.

Statistical calculations were performed with the χ^2 -test.

Results

A total of 336 patients showed a positive skin prick test towards grass pollen. The distribution of the birth month of these patients was compared with the expected distribution. No consistent pattern was revealed and patients born in June and July had the same risk for a positive skin test to grass pollen as patients born in the remaining part of the year (Fig. 1). This applied to both sexes. The patients were divided into age groups 15–20, 21–25 and 26–30 years of age. In none of these groups an increased incidence of patients born in June or July was present compared to the entire population (Table 1).

A total of 240 patients showed a positive skin test towards the extract of house dust mite. Compared with the birth months of the control population birth of a house dust mite allergic patient was less likely during the winter and spring. In contrast, a higher proportion of the house-dust-mite-allergic patients were born in a summer or autumn months from May to September inclusive was highly significant ($\chi^2 = 8.0$, d.f. = 1, $P < 0.005$). The house-mite-allergic patients were divided into age groups as above. The over-representation of a birth month from May to September was evident for the group 25–30 years of age, and a tendency in the same direction was found for the groups 15–20 and 20–25 years of age (Table 2). The increased of births from May to September was clearly seen for men and a tendency in the same direction was found for women. The increased prevalence of house-dust-mite-allergic persons born in the

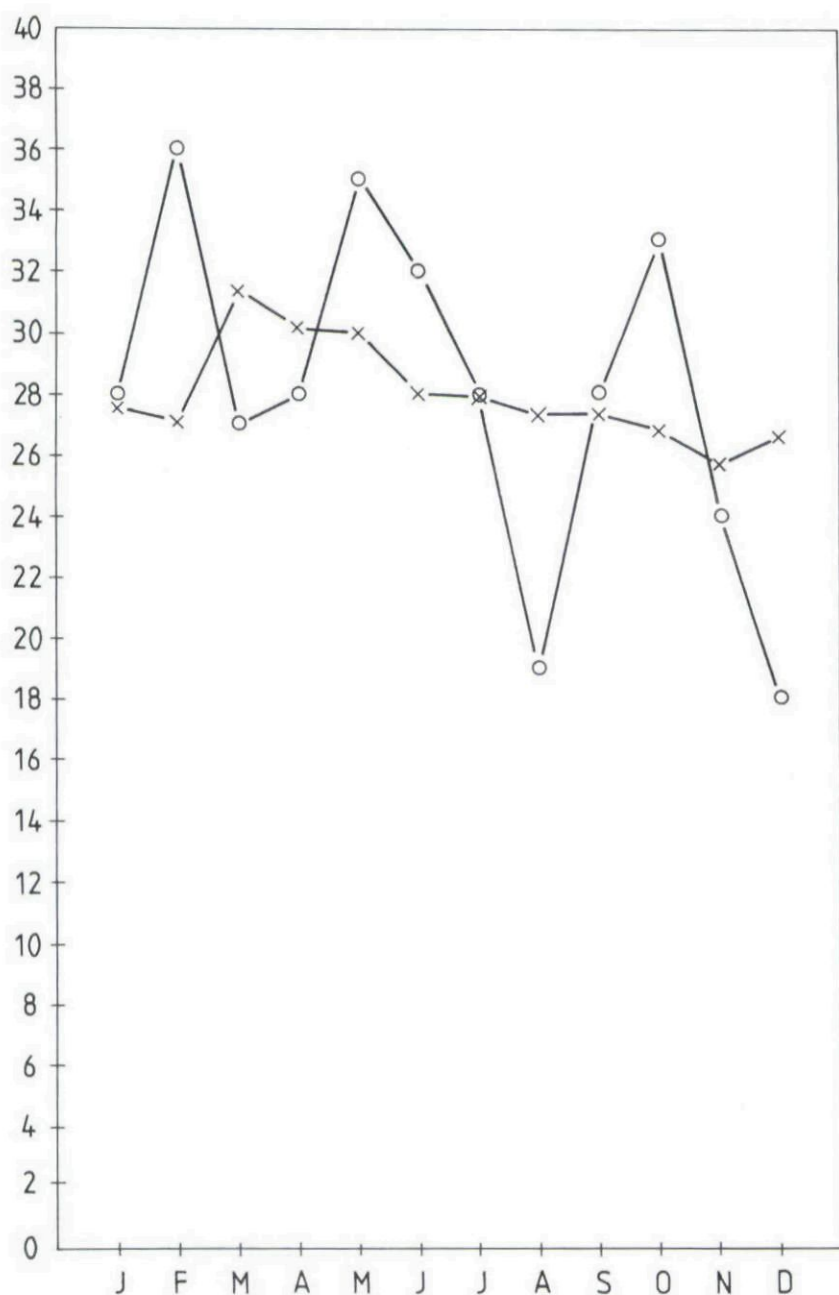


Fig. 1. Distribution of the month of birth in 336 adult patients with bronchial asthma or rhinitis and a positive skin prick test towards grass pollen (O—O). For comparison the expected distribution for their birth month is shown (x—x).

Table 1. Three hundred and thirty-six patients with a positive skin prick test towards grass pollen. The observed and expected number with a birth month in June or July (J-J), calculated with regard to age and sex

	Age (years)						Sex			
	15-20	(n)	21-25	(n)	26-30	(n)	Men	(n)	Women	(n)
Observed (J-J)	32	(148)	14	(104)	13	(84)	31	(196)	28	(140)
Expected (J-J)	24.6		17.3		14.0		32.4		23.1	
χ^2	2.7		0.8		0.1		0.3		1.0	

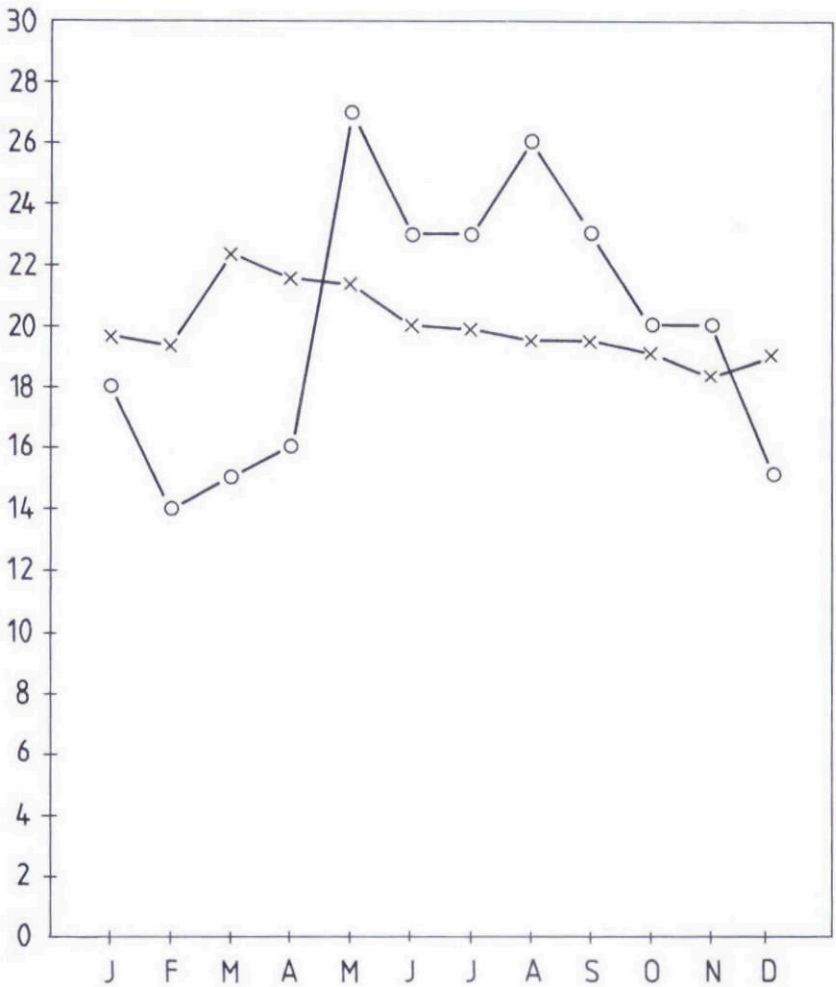


Fig. 2. Distribution of the month of birth in 240 adult patients with bronchial asthma or rhinitis and a positive skin prick test towards house dust mite (O—O). For comparison the expected distribution for their birth month is shown (x—x).

Table 2. Two hundred and forty patients with a positive skin prick test towards house dust mite. The observed and expected number with a birth month from May to September inclusive (M-S), calculated with regard to age and sex

	Age (years)						Sex			
	15-20	(n)	21-25	(n)	26-30	(n)	Men	(n)	Women	(n)
Observed (M-S)	42	(82)	38	(80)	42	(78)	78	(150)	44	(90)
Expected (M-S)	34.7		33.7		32.7		62.9		38.1	
χ^2	2.7		1.0		4.6		6.3		1.6	

period from May to September inclusive corresponded to a relative risk (Armitage, 1971) of 1.44 (95% limits of confidence = 1.12-1.85). This means that the risk for persons born from May to September to develop house dust mite allergy is 44% higher compared with persons born in the rest of the year.

Discussion

Production of allergen-specific IgE antibodies can only occur after exposure to the allergen. The hypothesis of a special vulnerable period around the age of 3 months with an increased risk of an allergic disease in later life has been proposed (Taylor *et al.*, 1973). At the age of 3 months, a temporary decrease in serum IgA has been observed (Taylor *et al.*, 1973). This may be accompanied by low concentrations of IgA in intestinal and bronchial secretions which results in an ineffective antigen exclusion (Soothill, 1974) or ineffective antigen exclusion could result from recurrent respiratory infections as children with frequent respiratory infections often have a transient IgA deficiency (Østergaard, 1980). Airborne allergens under these circumstances could more easily penetrate the bronchial epithelium and give rise to specific IgE production. In an allergic population immunodeficiency (especially IgA deficiency) was found thirty-five times more frequently compared with normal controls (Kaufman & Hobbs, 1970). Adults with a positive skin test towards house dust mite also had significantly lower concentration of mite-specific IgA compared with controls (Stokes, Taylor & Turner, 1974).

Adults with bronchial asthma and house dust mite allergy were found to have been more heavily exposed to house dust mites at the time of first diagnoses compared with the exposure of a control population (J. Korsgaard, unpublished). Exposure to the house dust mite during the first months of life influences the occurrence of detectable house dust mite allergy in later life. It therefore seems advisable to reduce exposure to house dust mites in early childhood. Presumably by a reduction in air humidity in the homes (Korsgaard, 1982).

The present study supports the view that antigen exposure in the first months of life increases the risk of developing an allergy in later life. Patients born in the season when house dust mites were most abundant have a more than 40% increased risk for development of house dust mite allergy. This agrees with previous studies in England (Morrison Smith & Springett, 1979; Warner & Price, 1978), but others have not been able to confirm this finding (Pearson, Frees & Taylor, 1977; Kemp, 1979).

Pollen allergens have a well-defined seasonal variation compared with the house dust mite, and it could be expected that a connection between the month of birth and grass pollen allergy would be more evident than the connection between house dust mite exposure and house dust mite allergy. Previous studies have found an increased prevalence of grass pollen allergic patients born in December and February (Pearson, Frees & Taylor, 1977) or in the grass pollen season (Kemp, 1979). In an extensive study, patients with birch pollen allergy were more often born during the birch pollen season and in addition a positive association was found between years of supposed high birch pollen counts and the year of birth (Björnstein, Suoniemi & Losui, 1980). In the present study it was not possible to detect an association between the month of birth and grass pollen allergy in adults. A similar result was published by Morrison Smith and Springett (1979). The discrepancies between the studies may be caused by different geographic conditions and by the age of the patients at the time of investigation. The present study concerned patients between 15 and 30 years of age. An association between the time of birth and allergy to pollens may be most clearly seen when patients of 10–14 years of age are studied (Björnstein & Suoniemi, 1981), and this connection may disappear after the age of 20 years. It is possible that genetic factors have more influence on pollen allergy. However, environmental conditions are highly important and may control the development of allergic disease. Therefore exposure to potent allergens should be minimized especially in individuals at risk for allergic disease. Allergen avoidance is also of importance in early childhood when a priming period may be present.

Acknowledgments

A. Holst Andersen, MSc, Department of Statistics, University of Århus, is thanked for his help with the statistical analysis and Karin Krog for helping with registrations of patient data.

References

- ARMITAGE, P. (1971) *Statistical Methods in Medical Research*, 4th ed. Blackwell Scientific Publications, Oxford.
- BJÖRNSTEIN, F. & SUONIEMI, I. (1981) Dependence of immediate hypersensitivity on the month of birth. *Allergy*, **36**, 263.
- BJÖRNSTEIN, F., SUONIEMI, I. & LOSUI, V. (1980) Neonatal birch-pollen contact and subsequent allergy to birch pollen. *Clinical Allergy*, **10**, 585.
- KAUFMAN, H.S. & HOBBS, J.R. (1970) Immunoglobulin deficiencies in an atopic population. *Lancet*, **ii**, 1061.
- KEMP, A.S. (1979) Relationship between the time of birth and the development of immediate hypersensitivity to grass-pollen antigens. *Medical Journal of Australia*, **1**, 263.
- KORSGAARD, J. (1982) Preventive measures in house dust allergy. *American Review of Respiratory Disease*, **125**, 80.
- KORSGAARD, J. (In press) Mite-asthma and residency—a case control study on the impact of exposure to house dust mite in dwellings. *American Review of Respiratory Disease*.
- MORRISON SMITH, J. & SPRINGETT, U.H. (1979) Atopic disease and month of birth. *Clinical Allergy*, **9**, 153.
- MURRAY, A.B. & ZUK, P. (1979) The seasonal variation in a population of house-dust mites in a North American city. *Journal of Allergy and Clinical Immunology*, **62**, 266.
- Østergaard, P.A. (1980) Clinical features in children with transient IgA deficiency. *Ugeskrift for Læger*, **142**, 2280.
- PEARSON, D.J., FREES, D.L.J. & TAYLOR, G. (1977) Respiratory allergy and month of birth. *Clinical Allergy*, **7**, 29.
- SANDBERG, I., WEEKE, E. & NÜCHEL PETERSEN, B. (1982) Results of pollen counts. In: *Symposium on Pollen and Fungal Spores. Scanticon, Århus*. (eds E. Weeke and B. Nüchel Petersen) Fisons, Denmark.

- SOOTHILL, J.F. (1974) Immunodeficiency and allergy. *Clinical Allergy*, **3**, Suppl., 511.
- STOKES, C.R., TAYLOR, B. & TURNER, M.W. (1974) Association of house-dust and grass-pollen allergies with specific IgA antibody deficiency. *Lancet*, **ii**, 485.
- SUONIEMI, I., BJÖRNSTEIN, F. & HAAHTELA, T. (1981) Dependence of immediate hypersensitivity in the adolescent period on factors encountered in infancy. *Allergy*, **36**, 263.
- TAYLOR, B., NORMAL, A.P., ORGEL, H.A., TURNER, M.W., STOKES, C.R., SOOTHILL, J.F. (1973) Transient IgA deficiency and pathogenesis of infantile atopy. *Lancet*, **iii**, 111.
- VOORHORST, R., SPIEKMA, F.TH.M. & VAREKAMP, H. (1969) *House Dust Atopy and the House Dust Mite*. Stafleu's Scientific Publishing Co., Leiden.
- WARNER, J.O. & PRICE, J.F. (1978) House dust sensitivity in childhood asthma. *Archives of Disease in Childhood*, **53**, 710.

This document is a scanned copy of a printed document. No warranty is given about the accuracy of the copy. Users should refer to the original published version of the material.