

Atopic disease and month of birth

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Summary

Analysis of the month of birth of 1715 children with asthma shows clear evidence of a higher proportion of the group having been born between May and October (54.8%) than would be expected by comparison with the population of England and Wales (50.2%). Inspection of the distribution of month of birth for patients with hay fever and for patients with positive skin reactions to mixed grass pollen does not account for this seasonal variation but children with positive skin reactions to *Dermaphagoides pteronyssinus* show a high proportion (56.2%) born in the period May to October.

Although the reasons for the variation of pattern of month of birth in asthmatic children are uncertain, further study of sensitization in early life might clarify them.

Introduction

Exposure to antigens in the first few weeks of life might be expected to increase or to decrease subsequent sensitization, depending on the route of entry, the degree of exposure, the nature of the antigen and the response of the individual. The possibility that immune tolerance to airborne pollen could be induced by exposure to pollen immediately after birth was previously examined (Morrison Smith, 1970). No evidence was then found that there was a significant difference in the numbers of subjects with known pollen allergy born in any month of the year. More recently, Björkstén & Suoniemi (1976) reported that in males but not in females the month of birth distribution differed significantly from the total population in Finland in patients with pollen allergy and allergy to animal epithelia. In both cases there was an excess of births of these allergic subjects in Spring (March–May) and in Autumn (September–November). Pearson, Freed & Taylor (1977) studied the month of birth of 476 patients with respiratory allergy seen in Manchester. Comparison with the general population of England and Wales indicated that pollen-sensitive subjects were born more fre-

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quently in the months December to February than August to November, and this trend was most clearly seen in females. They found no month of birth difference in patients with perennial symptoms or allergy to *Dermatophagoides* spp.

We have examined a series of 1715 children, mainly aged between 5 and 15 years, who were seen initially at the Asthma Clinic between 1969 and 1975. The majority were born in the period 1956–1970.

Results

The first column of Table 1 shows the number and percentage of the children with

Table 1. Calendar month of birth of children with asthma and of live births in England and Wales

Month	Children with asthma (observed)		Live births, England and Wales 1956–1970 (%)	Children with asthma (standardized)	
	Number	%		Number	%
January	139	8.10	8.40	137.9	8.04
February	127	7.41	8.00	132.2	7.71
March	133	7.76	9.13	121.4	7.08
April	137	7.99	8.55	133.4	7.78
May	161	9.39	8.82	152.1	8.87
June	146	8.51	8.34	145.8	8.50
July	168	9.80	8.46	165.5	9.65
August	147	8.57	8.25	148.5	8.66
September	156	9.10	8.21	158.3	9.23
October	160	9.33	8.14	163.8	9.55
November	130	7.58	7.65	141.5	8.25
December	111	6.47	8.06	114.7	6.69
Total	1715	100.00	100.00	1715.0	100.00

asthma who were born in each calendar month. The second column shows the percentage of all live births in England and Wales in the period 1956–1970 occurring in each calendar month. This month of birth distribution for the whole population shows some fluctuation, partly related to the number of days in the month, but also some seasonal variation, the months from February to July inclusive being the period with above average numbers of births when the length of month is allowed for.

In the final column of Table 1 the number of children with asthma born each month has been standardized* to allow for the effects of the length of month and the seasonal variations in the general population. If the children with asthma have the same pattern of birth distribution as the general population, the final column of Table 1 should show no more than chance differences from a value of $1715/12 = 142.9$, or 8.33% each month.

Both the observed and standardized distributions of month of birth of children with asthma show more than the median number of births for the months from May

* The number of children with asthma born in each month is divided by the percentage of the general population born in the same month and multiplied by 100/12 (8.33%). The total number of births so obtained differs slightly from 1715, so a further small proportional change is made in the number for each month to bring the total number of births to 1715.

to October inclusive, with the numbers in the remaining months being below the median value. Such a cyclical pattern is unlikely ($P < 0.004$) to have arisen by chance (Edwards, 1961). 54.5% of the children with asthma were born in the period May to October compared with 50.2% of the general population.

Using the method of analysis, assuming simple harmonic variation proposed by Edwards (1961), the month of birth distribution of children with asthma is unlikely ($P < 0.01$) to have arisen by chance, and the ratio of highest to lowest incidence is 1.27:1. The only difference between the observed and standardized distributions is in the time of occurrence of the peak incidence. For the observed distribution the peak occurs about the third week of July. Correction for the seasonal effect in the general population by standardization postpones the peak to about the second week of August, and this is probably the more accurate summary of the maximum effect of whatever is responsible for the seasonal pattern of month of birth observed in the children with asthma.

Month of birth in clinical and skin sensitivity subgroups

1286 out of the 1715 children were skin-tested to both pollen and *Dermatophagoides* spp. More than half of those skin-tested (54.2%) were born in the period May to October.

Table 2. Season of birth of children with asthma related to skin sensitivity

		Asthmatic children born May–October		
		Pollen sensitive		All children skin tested
		(+)	(–)	
Mite sensitive	{ +	50.8%	52.9%	56.2%
	{ –	46.7%	46.4%	46.6%
Total		50.0%	56.6%	54.2%

Table 2 shows the relationship between the skin test results and the season of birth. The seasonal distribution is almost entirely due to the high proportion (59.2%) born in the period May to October in the large group sensitive to mite products but not to pollen. In those positive to both pollen and mites only just over 50% were born in May to October, while in the mite-negative groups less than 50% were born in the period May to October, with no real difference between those pollen-positive and those pollen-negative. The high proportion born in the period May to October in the whole group is due entirely to the high proportion born in this period in the group with skin tests positive to mite products but negative to pollen.

The distribution of month of birth of those with clinical hay fever was close to the pattern of the general population (50.7% born May to October), while in those with no hay fever a larger proportion (54.9%) were born in the period May to October.

Discussion

This group of children with asthma presented at an Asthma Clinic at various ages,

mostly after age 5 years, and skin-testing was performed when they presented. No local control group of children without asthma is available. These facts concerning the method of presentation of the group need to be borne in mind in considering possible explanations of the findings.

It is theoretically possible that the birth of asthmatic children actually occurs seasonally because of genetic or social influences—asthmatic parents might avoid conception, or delivery, at certain times, or there might be a variation in fertility associated with seasonal allergy in parents. It seems improbable that any such family effect produced the results demonstrated.

It is more likely that exposure to allergens at a certain period soon after birth is associated with a greater tendency to produce hypersensitivity than exposure at other times.

It is possible that our group of town-dwelling children were at risk of exposure to mite products in the home in the first few months of life but not significantly to pollen. The seasonal pattern of the births would fit with a maximum of mite exposure in the Autumn.

Children capable of developing hypersensitivity may also be more likely to develop asthma, so that when a group of children with asthma is identified and studied later in childhood the group will show a month of birth pattern different to that of the whole population, which is predominantly non-asthmatic and non-hypersensitive.

It is possible that the children most susceptible to asthma and hypersensitivity have developed hypersensitivity to all common allergens by the time they present with asthma and are skin-tested. This would account for the children with asthma and positive to both pollen and mites having a month of birth pattern similar to that of the general population. Less susceptible children may develop sensitivity to only a small number of allergens, and perhaps especially at a particular period soon after birth. This might account for the quite marked month of birth pattern in children with asthma sensitive to mites but not to pollen.

The month of birth pattern in children with no asthma but sensitive to mites would provide further information. The pattern for children with asthma in the various sensitivity groups at different ages would also be helpful, especially the pattern at ages 2, 3 and 4 years.

These results differ quite markedly from those reported by Pearson *et al.* (1977), perhaps due to our larger numbers, differences in the method of collection of asthmatics, and differences in age distribution. The month of birth pattern shown by their pollen-sensitive group (high in December to February) is in fact similar to that shown by our pollen-sensitive and mite-negative group, although it is not shown by our group sensitive to mites as well as pollen.

The results also differ from those of Björkstén & Suoniemi (1976). We have not separated our results by sex and they have considered allergy to animal epithelia and not to *Dermatophagoides* spp. Pollen exposure in Finland differs from that in England. Birch tree pollen appears to have little clinical importance in England, where the grasses are of overwhelming importance. The seasonal variation in births of the Finnish population may relate to the extreme climatic variations, but there is some similarity between the seasonal variation of births of patients sensitive to animal epithelia in Finland and patients sensitive to mite extracts in England. It seems quite likely that the pattern for mite-sensitive patients in Finland would be similar to that for animal-sensitive patients.

Although we have failed to find a seasonal variation in the month of birth in the group first considered most likely to show this, the pollen-sensitive patients, we have shown that asthmatic children as a group show a different pattern of month of birth from that of the general population and that this may well be due to the large number of mite-sensitive subjects present in the total number examined.

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References

- BJÖRKSTÉN, F. & SUONIEMI, I. (1976) Dependence of immediate hypersensitivity on the month of birth. *Clinical Allergy*, **6**, 165.
- EDWARDS, J.H. (1961) The recognition and estimation of cyclic trends. *Annals of Human Genetics*, **25**, 83.
- MORRISON SMITH, J. (1970) Immune tolerance and pollen allergy. *Lancet*, **i**, 307.
- PEARSON, D.J., FREED, D.L.J. & TAYLOR, G. (1977) Respiratory allergy and month of birth. *Clinical Allergy*, **7**, 29.

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