Is the prevalence of atopy increasing?

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SUMMARY. There is controversy about whether allergic disease has increased in recent decades. This study compared the prevalence of atopy, as shown by allergy skin prick testing among adults in 1988 (n = 74) with a similar study carried out in 1974 (n = 1359). Both study groups were drawn from the general population in south west London, but the 1988 sample specifically excluded people with rhinitis. The proportion of subjects with at least one positive reaction to a panel of three common allergens increased significantly from 23% in 1974 to 46% in 1988 (P<0.01). If allowance was made for the exclusion of rhinitic subjects from the 1988 sample, the current prevalence of atopy may be higher still. The increase in prevalence was significant in older subjects (aged 55–59 years) and women but not in other age groups or in men. This small study raises the possibility that atopy has increased in prevalence in the UK over recent decades and additional studies are needed to evaluate the validity of this hypothesis.

Introduction

THERE is presently much controversy about whether the prevalence of allergic disease is increasing. Certainly general practice consultation rates for hay fever have risen from 10.6 per 1000 in 1971 to 19.7 per 1000 in 1981.[1] Those for asthma have risen from 9.6 per 1000 in 1971 to 17.8 per 1000 in 1981.[1] In addition, hospital admissions for asthma have nearly trebled since 1960.[2] Some investigators believe that the upward trend in service utilization reflects a rise in the underlying prevalence of allergic disease.[3] Others have disputed this, arguing instead that there has been a change in patients' consulting behaviour or doctors' diagnostic preferences.[4] The controversy is difficult to resolve, given that there are no widely accepted, objective criteria for identifying asthma, hay fever, or other allergic diseases.

Studies of atopy may help to resolve the controversy, since atopy can be established by objective methods and is not subject to bias arising from changes in the behaviour of patients or doctors. Atopy, as measured by allergen skin testing, is an important attribute of allergic disease. Not all atopic individuals are symptomatic and not all those with allergic symptoms are atopic. Nevertheless, population studies show that there is a close association between the prevalence of allergic disease and the prevalence of atopy.[5] Genetic studies suggest that atopy is inherited independently of the propensity to specific allergic disease, but that the presence of atopy can enhance the likelihood that allergic disease will be expressed.[6] It therefore seems likely that an increase in the prevalence of atopy might accompany, or indeed cause, an increase in the prevalence of allergic disease.

We report here the prevalence of positive reactions to skin prick testing in two community samples of adults, one examined in 1974 and the other in 1988. The findings yield valuable information on the changing prevalence of atopy in a south west London community.

Method

The two community samples of adults came from contiguous health districts in south west London. The first sample was collected in 1974 as part of a larger investigation into health screening. The original study group consisted of all adults aged 40 to 65 years and their spouses who were registered with a group general practice in Merton in 1968 and who were still resident in the area in 1974. Eligible subjects were interviewed and given a general medical examination which included skin prick tests for allergy. After exclusion of patients with invalid skin prick tests (see definition below) and those aged under 30 years, the study group comprised 1359 subjects aged 30 to 65 years inclusive.

The second sample was collected in 1988 as part of a community survey of rhinitis.[7] The original study group consisted of all patients, aged 16 to 65 years inclusive, registered with a group general practice in Wandsworth. Eligible subjects were asked to complete a postal screening questionnaire designed to identify those with rhinitis. A random sample of 126 subjects without rhinitis were interviewed and given allergy skin tests. After exclusion of the 26 subjects whose allergy skin tests were invalid and a further 26 subjects who were aged under 30 years, the study group comprised 74 subjects aged 30 to 65 years. The age–sex distribution of the two samples showed that subjects in the 1988 survey tended to be younger than those who took part in the 1974 survey.

In both the 1974 and 1988 studies, allergy testing was carried out using the modified prick method of Pepys.[8] The panel of allergens used in both studies included: mixed grass pollen, house dust and *Dermatophagoides pteronyssinus* (house dust mite), supplied by Bencard Ltd. Glycerol and histamine controls were also used. A drop of each test solution was placed on the volar aspect of the forearm and gently pricked through with a needle. Weal diameters were recorded at 10 minutes. A test was declared invalid if the histamine control failed to produce a weal at least 1 mm in diameter and these patients were excluded. In the event of a reaction to the glycerol control, the weal diameter for glycerol was subtracted from that for each allergen and the difference reported.

The differences in the prevalence of skin test positivity between 1974 and 1988 are reported together with the 95% confidence intervals (CI) of the differences. The probability is given for the test of the null hypothesis of equality.

Results

The proportion of subjects with at least one positive reaction, 1 mm or more in diameter, showed a significant increase from 23% (312/1359) in 1974 to 46% (34/74) in 1988 ($P<0.001$) (Table 1). The increase remained significant when the criterion for a positive reaction was changed from a weal 1 mm or more in diameter to a weal 3 mm or more in diameter; by these more

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Submitted: 20 November 1989; accepted: 2 March 1990.

stringent criteria, the prevalence of skin test positivity rose from 17% (225/1359) in 1974 to 28% (21/74) in 1988 ($P<0.01$). The increase in prevalence was evident in both sexes, but reached significance in women only (Table 1).

For each five year age band from 30 through 60 years the prevalence of skin test positivity, using a weal ⩾1 mm diameter as the criterion, was higher in 1988 than in 1974 (Table 2). However, owing to the small size of the 1988 sample, these differences reached significance only in the 55–59 year old age group.

Skin test reactivity to each of the three allergens examined rose from 1974 to 1988 (Figure 1). Using a weal ⩾1 mm in diameter as the criterion for a positive reaction, the increase in positive reaction was significant for grass pollen ($P<0.001$) and house dust ($P<0.001$), but not house dust mite. Using the more stringent criterion for positivity of a weal ⩾3 mm, the increase in skin test positivity was significant for grass pollen only ($P<0.01$).

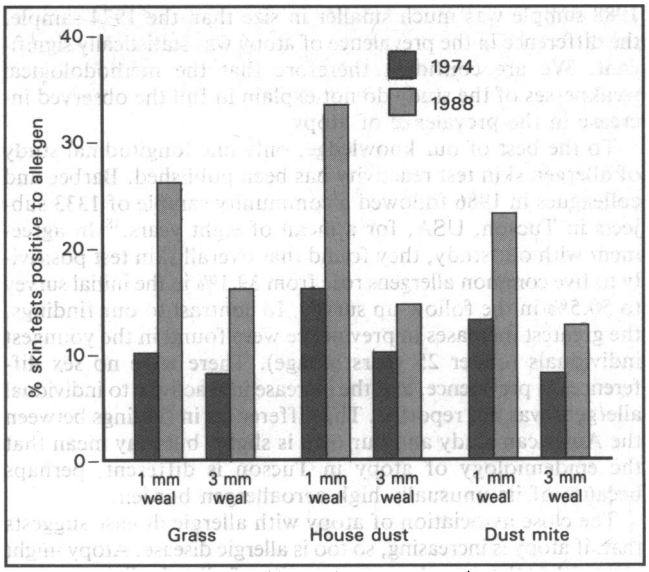

Figure 1. *Prevalence of skin tests which were positive to specific allergens.*

Discussion

This study shows that there has been a significant increase in the prevalence of allergen skin test reactivity in south west London from 23% in 1974 to 46% in 1988. The significant increase in prevalence was in older subjects (aged 55–59 years) and women. Sensitivity to grass pollen showed a significant increase, using a weal size of ⩾3 mm.

The overall increase in atopy may be even greater than these figures suggest because the prevalence of skin test positivity in 1988 was underestimated by excluding subjects with rhinitis. Our community survey showed that rhinitis affected 27% of the general population and that 79% of rhinitic subjects were skin test positive (weals ⩾1 mm). If allowance is made for the exclusion of rhinitic subjects from the 1988 sample, the current prevalence of atopy may be as high as 55%.

Variation in the reported prevalence of atopy can be caused by differences between investigators in their selection of allergens, skin test method, and study populations.[9-18] The differences in our methods between 1974 and 1988 were minimal, but may have contributed in part to the observed increase in skin test positivity. Skin test reagents were obtained from the same manufacturer, but did not come from the same batches. Subjects were recruited by similar means from adjacent communities, but the same individuals were not followed over time. The prevalence of atopy in the 1974 sample was similar to that reported by Greenberg and colleagues for British adults in 1970, but there were no recent British studies with which to compare our 1988 sample.[9] These problems notwithstanding, any bias favouring an upward trend in skin test positivity would be offset by the fact that individuals with rhinitis were specifically excluded from our 1988 sample, thereby reducing the prevalence of atopy. Although the

Table 1. Prevalence of skin test positivity by sex in Merton in 1974 and Wandsworth in 1988.

Subjects	Weal size	Number (%) of tests positive: 1974	1988	% difference	(95% CI)
Men	⩾1 mm	153/583 (26)	11/30 (37)	−11	(−28, +7)
	⩾3 mm	122/583 (21)	7/30 (23)	−2	(−18, +13)
Women	⩾1 mm	159/776 (20)	23/44 (52)***	−32	(−47, −17)
	⩾3 mm	103/776 (13)	14/44 (32)*	−19	(−33, −5)
Total	⩾1 mm	312/1359 (23)	34/74 (46)**	−23	(−35, −11)
	⩾3 mm	225/1359 (17)	21/74 (28)*	−11	(−22, −1)

CI = confidence intervals.

Table 2. Prevalence of skin test positivity by age in Merton in 1974 and Wandsworth in 1988.

Age (years)	Number (%) of tests positive[a]: 1974	1988	% difference	(95% CI)
30–34	20/53 (38)	6/13 (46)	−8	(−39, +22)
35–39	67/249 (27)	8/17 (47)	−20	(−45, +4)
40–44	75/313 (24)	4/11 (36)	−12	(−36, +18)
45–49	55/234 (24)	5/9 (56)	−32	(−65, +1)
50–54	58/276 (21)	4/7 (57)	−36	(−73, +1)
55–59	31/212 (15)	7/12 (58)*	−43	(−72, −15)
60–65	6/22 (27)	0/5 (0)	+27	(+5, +40)

[a] Weal diameter ⩾1mm. CI = confidence intervals.

1988 sample was much smaller in size than the 1974 sample, the difference in the prevalence of atopy was statistically significant. We are confident therefore that the methodological weaknesses of the study do not explain in full the observed increase in the prevalence of atopy.

To the best of our knowledge, only one longitudinal study of allergen skin test reactivity has been published. Barbee and colleagues in 1986 followed a community sample of 1333 subjects in Tucson, USA, for a mean of eight years.[18] In agreement with our study, they found that overall skin test positivity to five common allergens rose from 39.1% in the initial survey to 50.5% in the follow-up survey. In contrast to our findings, the greatest increases in prevalence were found in the youngest individuals (under 25 years of age). There were no sex differences in prevalence, and the increase in reactivity to individual allergens was not reported. The differences in findings between the American study and our own is slight, but may mean that the epidemiology of atopy in Tucson is different, perhaps because of its unusually high aeroallergen burden.

The close association of atopy with allergic disease suggests that, if atopy is increasing, so too is allergic disease. Atopy might raise either the prevalence or severity of allergic diseases, producing a consequent rise in medical service utilization by patients with hay fever and asthma. Why atopy should be increasing is unclear. One possibility is that changes in allergen exposure have occurred, perhaps as a result of changing lifestyle or environmental pollution.[19] In postulating an increase in the prevalence of hay fever, it is notable that grass pollen sensitivity rose more steeply than the other allergic sensitivities in this study. This may reflect a change in the nature and pattern of exposure to grass or allied pollens, at least among individuals in London.

This study is flawed in that we were unable to exactly repeat in 1988 the survey we first carried out in 1974. Additional studies are therefore needed to investigate the hypothesis that atopy is increasing, and if so, the reasons for this increase. Research into the epidemiology of atopy may give more insight into the aetiology of allergic disease than studies which focus on diagnosed disease such as asthma or hay fever.

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Acknowledgements

We would like to thank the Medical Research Council for its support of this work; the doctors of the Brocklebank Health Centre; and the patients themselves. Our thanks also to Professor H R Anderson.

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