

Serum IgE levels and allergic spectra in immigrants to Sweden

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We evaluated the allergy status of 134 immigrants from Asia, Africa, the Middle East and South America, who were referred to our clinic during the past 10 years. Fifty Swedish patients were used for comparison. When the atopy state was not taken into account, no significant difference was found between the two groups with respect to total IgE levels. However, IgE levels of non-atopic immigrants were significantly higher than the IgE levels of non-atopic Swedes. While there was no significant difference in IgE levels between atopic and non-atopic immigrants, this difference was significant in Swedish patients. In general, IgE levels of immigrants showed a decline with time and reached approximately the same levels as for the Swedish patients in 10.5 years. In the immigrant group atopic women had a considerably lower IgE level than the atopic men. Among the atopics there were no differences between sexes. In Swedes and immigrants pollen was the most common group of allergens. The spectrum of allergy in the immigrant group changed with time in Sweden, and gradually became more similar to the Swedish spectrum. Skin and/or RAST positivity to birch increased from 16% within 2.5 years to 53% after more than 10.5 years in Sweden. Our data indicate that environmental factors rather than hereditary differences determine the IgE state. Within a few years the immunologic status of immigrants adapts to the new environment.

Clinical aspects

With the large migration of various peoples the clinician often sees patients from different parts of the world. Our study stresses that determination of total serum IgE is usually not a good screening method to diagnose atopic disorders since IgE is high even in non-atopics in some parts of the world. It should also be kept in mind that the allergen spectrum changes when people move to a new environment. Thus, it is advisable to retest allergic persons after some years in the new country.

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Studies from different parts of the world, dealing with the prevalence and etiologies of allergy, report variations among regions and countries (10). These differences are supposed to depend on variations in geography, climate, religion, and traditions, as well as social and possibly ethnic factors. Most studies deal with circumstances in Western countries, whereas much less is known about developing countries.

Today's world is characterized by migrations between countries and continents; it is estimated that there are now about 15 million refugees. Virtually nothing is known about what happens to the allergy pattern when people move between differing environments. As the Stockholm–Uppsala region has received large groups of immigrants during recent

decades, we undertook this study as a first step toward investigating the pattern and changes in allergy among immigrants to Sweden.

Patients and methods

The study was retrospective, investigating records from people born outside Sweden and attending the Department of Allergy, Uppsala University Hospital during the period January 1979 to November 1989. Data concerning 134 patients were compiled. They originated from Africa, South America, the Middle East (Turkey, Iran, Lebanon, Syria, Iraq and Jordan) and the rest of Asia (Table 1). The mean residential time in Sweden was 6.7 ± 4.6 years. A control group of 50 randomly selected Swedish patients,

Table 1. Demographic distribution of patients

Region	Women/Men	Age $\pm$ SD
Middle East (Turkey, Iran, Lebanon, Syria, Iraq, Jordan)	16/43	32 $\pm$ 8.4
Africa (Ethiopia, Morocco, Uganda, Algeria, Kenya, Egypt, Sudan, Tanzania, Senegal)	7/22	32 $\pm$ 8.2
South America (Chile, Brazil, Colombia, Argentina, Uruguay, Paraguay, Venezuela)	15/11	32 $\pm$ 9.5
Asia (India, Bangladesh, Pakistan, Uzbekistan, Taiwan, Thailand)	11/9	32 $\pm$ 9.3
Sweden	32/18	32 $\pm$ 13

attending the department during the same period, were also studied.

Data concerning smoking habits, time in Sweden, symptoms, duration of symptoms, pets at home, atopic heredity and earlier atopic diseases were recorded from the history taken at the first visit.

Skin prick test (SPT) was performed according to Østerballe et al. (13). Drops of allergen extract placed on the volar aspect of the forearm were penetrated by a lancet with a 1 mm point. The extracts used were birch, timothy, mugwort, cat, dog, horse, *Dermatophagoides pteronyssinus* (*D. pt*), *Cladosporium herbarum* and *Alternaria alternata*, purchased from Pharmacia, ALK or Dome/Holister-Stier. Histamine (1 mg/ml) and saline were used as positive and negative controls, respectively. The resulting wheal was measured after 15 min. The largest diameter and the perpendicular diameter were recorded and the geometric mean calculated. A mean diameter of at least 3 mm was considered to be positive.

Total serum IgE (Phadebas PRIST) and allergen-specific IgE (Phadebas RAST) were measured by the methods recommended by the manufacturer (Pharmacia AB, Uppsala, Sweden). RAST determinations were made for allergens as needed clinically.

Patients were considered to be atopic if they had at least one positive SPT or RAST reaction to common allergens.

Unpaired t-test was used for comparisons. Values of $p < 0.05$ were considered to indicate a significant difference. Logarithmic values were used for comparisons of total IgE levels.

Results

The number of men and women in the patient groups and the distribution between different areas of the world are presented in Table 1. The mean age of the patients in all five groups was, coincidentally, 32 years, although the range was varied.

Rhinoconjunctivitis and asthma were the most common diagnoses among both immigrants and Swedes.

When a multiple regression analysis was done

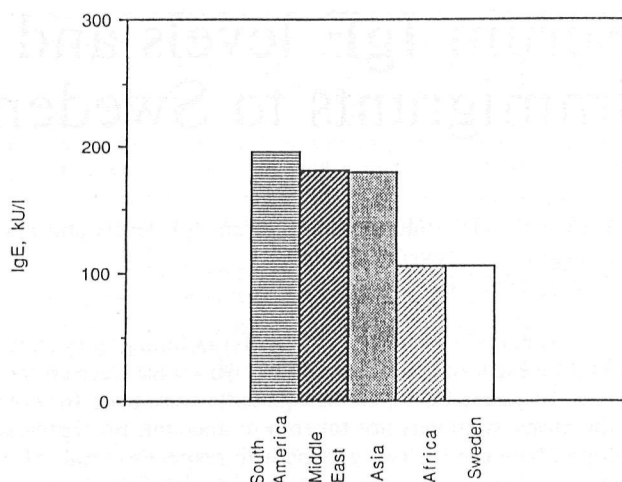


Fig. 1. Serum IgE (geometric mean) levels in patients from different parts of the world.

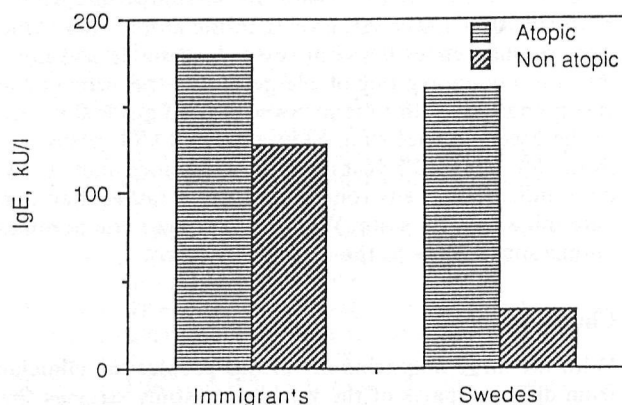


Fig. 2. Serum IgE (geometric mean) levels in Swedish and immigrant atopic and non-atopic patients.

between log IgE, time in Sweden, smoking habits, gender, place of birth and age, and SPT/RAST positivity, only time in Sweden and gender gave significant correlations. The difference between atopics and non-atopics was large in the Swedish group but insignificant among the immigrants (Fig. 2).

Serum IgE values varied between subjects as a function of residence time in Sweden (Fig. 3). Those tested after a short period in Sweden had the highest values, decreasing with longer period. The Swedes had the lowest values. The difference was statistically significant between those with residence < 4.5 years and those with > 4.5 years.

Immigrant women had an IgE level (geometric mean) of 116 kU/l and men 196 kU/l. Among the atopic immigrants there was a significant difference in IgE values (geometric mean) between women (99 kU/l) and men (265 kU/l). The change with time in Sweden of the IgE values was pronounced among the men, while no tendency to decrease was seen among the women (Fig. 4).

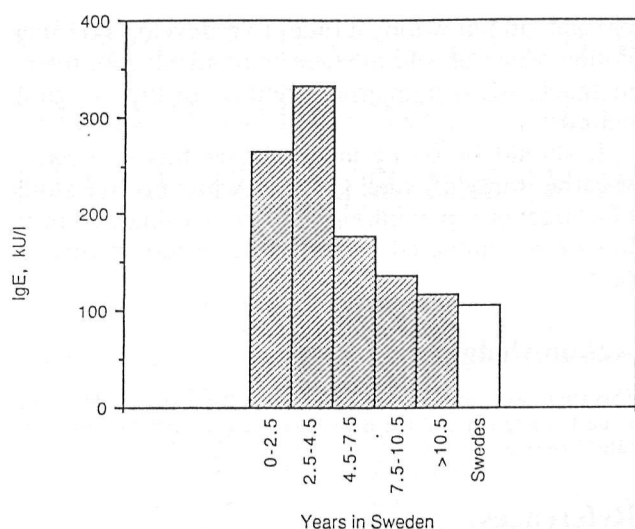


Fig. 3. Serum IgE (geometric mean) levels in patients with different periods of residence in Sweden.

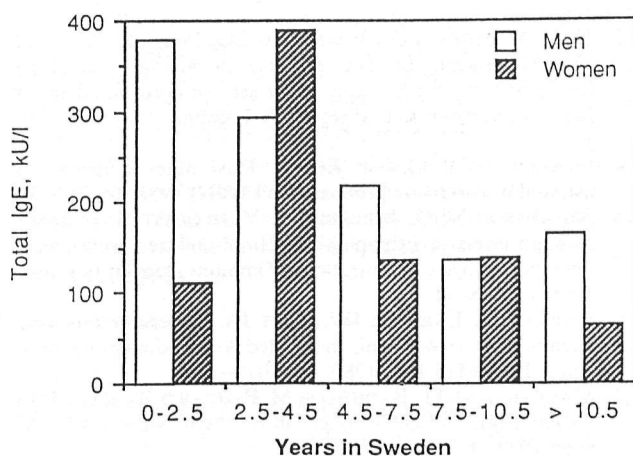


Fig. 4. Serum IgE (geometric mean) levels in males and females according to period of residence in Sweden.

The spectra of positive SPT and/or RAST reactions differed somewhat between the different populations. Reactions to pet animals were more common among Swedes than among any of the immigrant groups. Timothy pollen was the most common allergen in all groups except the African. Fig. 5 shows the changes with residence time in Sweden for the frequencies of some allergens. Reactions against pets and birch were less common among immigrants during the first 2.5 years of residence than among Swedes. The frequency of reaction to pets was further decreased after 10.5 years, whereas the birch frequency increased and came very close to the Swedish control value. The number of reactions to *D. pt.*, mugwort and molds was higher in the immigrant group with residence time < 2.5 years, as compared with the Swedish group, and decreased with

Allergy in immigrants

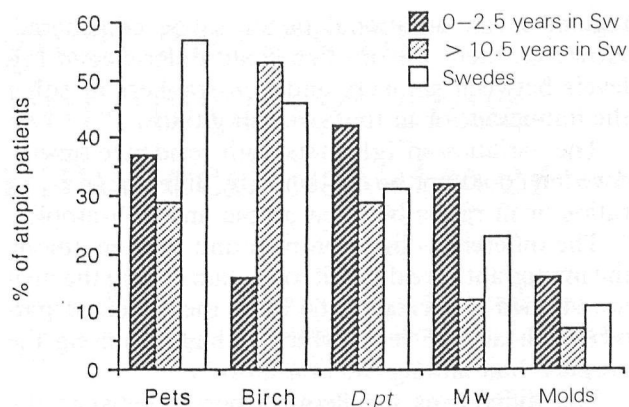


Fig. 5. Changes in allergy pattern with period of residence in Sweden. *D. pt.*: *Dermatophagoides pteronyssinus*; Mw: mugwort.

time. Thus, except for reaction to pets, the different reaction frequencies among immigrants approached the Swedish control group frequencies with time.

Discussion

Numerous reports show that the prevalence of allergic diseases and asthma varies considerably between different geographical regions (10). There are not many studies, however, of the effect of environment on such variations. IgE levels have been determined in populations from different parts of the world. Ethiopian children had 16 to 20 times higher values than Swedish children (5), and adult Nigerians (7) and adult Waorani Indians (6) had considerably higher levels than the reference values given by the manufacturer of the determination kits. It is known that racial differences (2, 3, 11) and parasite infestation (5, 8) have an effect on the serum IgE levels.

Immigrants to Israel showed different rates of asthma morbidity depending on their origin (1), and the rate changed with their residence time in Israel. Asthmatic Asian immigrants in the United Kingdom had largely the same allergy status as Caucasian asthmatics (9). Otherwise, not very much is known about how allergy changes when people move from one area to another.

It is well known (5) that parasite infestations influence serum IgE levels. Probably, a high infestation rate in the country of origin is the main reason for high IgE levels among non-atopic immigrants. This may explain the lack of difference between the whole groups of immigrants and Swedes and between atopic and non-atopic immigrants. Further, the decline in IgE with residence time in Sweden (Fig. 3) might be an effect of the decreasing parasite contact, although changes in urbanization and sanitary circumstances may also have had an influence. Another factor that influences the IgE levels is smoking (12), and different smoking habits in different

regions is an additional factor to be considered. However, there was no significant difference in IgE levels between smokers and non-smokers in either the immigrant or in the Swedish groups.

The variation in IgE titers with residence time in Sweden could not be explained by differences in sex ratios or in ratios between atopic and non-atopics.

The differences between men and women among the immigrants are difficult to explain. When the men are studied separately, one finds the expected pattern with an IgE level which is higher among the atopics than among the non-atopics.

The differences in allergen spectra between the different groups are surprisingly small. Allergies to pet animals appeared to be more common in Swedes than in any other group. The reason may be that more than three times as many Swedes as immigrants had pets at home. There is nothing known, however, about the pet frequency in the immigrants' countries of origin. The house dust mite situation is known to vary throughout the world (4). The allergy frequency, however, was almost the same (26–40%) in all groups investigated. Although there is little birch pollen in many parts of the world, as compared with Sweden, the skin and RAST positivity to birch pollen was as high in most immigrant groups as in the Swedish group.

When the immigrant groups were subdivided according to their residence time in Sweden, considerable differences were seen. The frequency of birch pollen allergy was low in immigrants with residence times in Sweden less than 2.5 years. The most striking change with time was that the birch allergy frequency increased more than three times among the immigrants with residence times greater than 10.5 years. Birch is the most common allergen among immigrants of all origins with residence time greater than 10.5 years in Sweden. The groups are too small, however, to analyze further the lag time for acquiring birch pollen allergy after arrival in Sweden.

Our results indicate that environmental factors in many parts of the world have a greater influence than hereditary factors on total IgE levels. The level of IgE is thus not a good tool for discriminating between atopics and non-atopics. The allergy spectrum approaches that of the adopted country a few years after immigration. Some of the questions to be answered are how long time it takes for an adult to develop an allergy to a new allergen, how long it takes to lose an allergy when the allergen is no longer

present, and how long it takes to redevelop IgE antibodies when an old allergen is reintroduced, for as instance, when immigrants returns to their original country.

It should be borne in mind that this is a retrospective study of small groups. A prospective study of a larger group of immigrants from a single country has been conducted to verify the results in this report.

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