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Multiple atopic sensitization and health care utilization in a cohort of immigrant children from a cross-sectional study of respiratory health and atopy in relation to poor-quality housing in Malmö, Sweden

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Abstract

Introduction: Exposure to allergens plays a role in the development of atopic sensitization and influences allergic phenotype. The effects of exposure to relevant allergens both from the indoor and outdoor environment are complex. Immigrant children and their families are exposed to new spectra of seasonal and perennial allergens, and often new lifestyle factors, such as diet, and living conditions. Furthermore health literacy and accessibility of healthcare systems will play a role in what impact atopic diseases will have on these populations.

Methods: As part of a larger study into the health in its social context of an immigrant population living in poor-quality housing in Malmö/Sweden, families with small children were identified from health care records (child treated in primary care with respiratory illness), and school records (matched for age range). Families were visited in their homes by health communicators fluent in their language. Family and individual level health data, including skin-prick-tests (SPT) for a standard panel of aeroallergens, were analyzed together with environmental exposures (mould, dampness, ETS, crowding and -in the part of the study presented here: health care utilization over 7 years at the primary care level (data linkage to relevant registries)

Results: 130 families participated, with usable data for 359 children under the age of 13, and 230 parents. The overall exposure to potentially harmful factors was relatively high, the burden of atopy and respiratory diseases was significant. 232 children under the age of 13 had SPTs performed, 48 of which were positive, of these 11 showed sensitization against 2 or more allergens. The spectrum of sensitizations was comparable to a Swedish population (seasonal plant pollen; animal dander, moulds, and house dust mites (HDM). Utilization of primary health care resources amongst the polysensitized children was overall comparable to that of a gender- and age-matched non-polysensitized control group (n=20) from the same cohort. Higher health care usage was seen in both groups only in children with a documented diagnosis of asthma.

Conclusion: In our cohort, it was rather the presence of an asthma diagnosis than polysensitization that drove higher utilization of primary health care resources, confirming that atopic sensitization in itself is not a disease state, but rather a marker of potential for atopic disease.

BACKGROUND

In 2008, the public in Sweden became aware of extremely poor housing conditions in certain areas of Rosengård, a predominantly immigrant neighbourhood in Malmö (county of Skåne, southern Sweden). Upkeep had been severely neglected by the proprietors for many years. Apartments in the affected neighbourhood, Herrgården, were overcrowded, damp, affected by mould, and infested by cockroaches and other vermin. The main property owner, after massive media attention and subsequent court trial, received an injunction from local authorities to perform extensive repairs in more than 800 housing units. This provided a unique opportunity to examine whether the health of children living in this neighbourhood had been affected by poor indoor environment; anecdotal reports from primary care centres had indicated unusually large numbers of children with asthma and allergies. The study approach also considered the social determinants of public health.

MATERIALS AND METHODS

Because the main study design was a prospective intervention study looking at the effect of the housing renovations on respiratory health in vulnerable children, children with respiratory symptoms were over-sampled at baseline, identified from records at the local health centres. These children and their siblings along with the parents were invited to participate in the study. In addition, a second set of children were identified from class-lists at the local schools, together with their siblings and parents. These families lived in a nearby area, Törnrosen, with buildings of similar age and construction, but with appropriate upkeep.

Base-line study

A total of 359 children were recruited, including 161 children from 53 apartments in Herrgården and 198 children from 77 apartments in Törnrosen. Initial home visits were carried out between May 27, 2010, and May 29, 2011, by "health communicators" - investigators fluent in the native language of the family. Interview questionnaires were used to collect demographic and lifestyle information for all core family members, subjective assessment of physical apartment characteristics, and health information for children aged 0-13 years at the time of visit with a main focus on respiratory, allergic, and dermal symptoms. Usually, the mother was the informant. A standardized visual assessment of multiple areas of all homes was carried out in all apartments. Informed written consent was obtained for all participating families

Linkage to healthcare registries

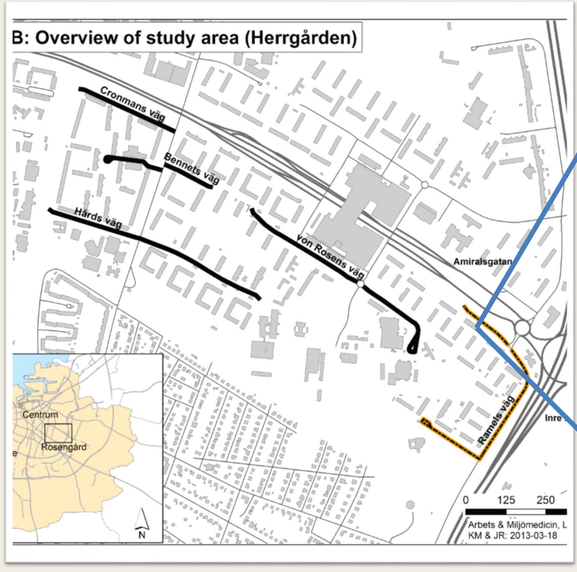
Sweden has a socialized health care system. Unique personal identification numbers are used in the documentation of all contacts with health care providers. Registries exist both for the primary and secondary care system, and these include diagnostic codes (ICD 10) for each contact.

As part of the underlying study, we gained access to data from the registries (spanning several years before and after the home visits for all participants.

Family atopy study

Families including parents and all siblings regardless of age were invited to diagnostic skin-prick testing (SPT) sessions at the local community centre in the days after the home visit. SPTs were carried out by experienced and qualified study nurses against a standard panel of aeroallergens (plus cockroach) according to usual international guidelines and standards. Children assented to testing.

We separately analysed the 11 children who showed sensitization against multiple allergens in the SPT, and formed a control group from the same cohort by hand-matching 20 non-polysensitized children for age and gender.



RESULTS 1

There was an overall number of 650 participants from 130 families. Of these, 359 were children between 0 and 13 years, and 291 were adults or older children (>13 years of age).

The place of birth was known for all participants: 89% of all children between 0 and 13 years had been born in Sweden. All children that had been born outside of Sweden entered the country well before their second birthday. All parents had been born outside of Sweden.

Skin Prick Tests

Data on skin prick testing is shown in Table 1

	Children (0-13 years)	Adults and older children
n	359	291
Skin prick tests performed (%)	232 (65%)	184 (63%)
SPT positive (% of performed)	38 (16.4)	49 (27%)
Polysensitized (% of pos.)	11 (29%)	23 (47%)
Pos. for birch (% of pos.)	8 (21%)	16 (33%)
Pos. for timothy (% of pos.)	12 (32%)	24 (49%)
Pos. for HDM (% of pos.)	13 (34%)	11 (22%)
Pos. for animals (% of pos.)	8 (21%)	7 (14%)
Pos. for cockroach (% of pos.)	4 (11%)	7 (14%)
Pos. for moulds (% of pos.)	7 (18%)	3 (6%)

The percentages for skin prick tests performed differed between participant subgroups. Only 52% of participating fathers had an SPT performed, as opposed to 82% of participating mothers. Positive SPTs were seen in 25% of the fathers and 27% of the mothers, which would speak against a strong selection bias.

Among the children, 24 of the 38 positive SPTs were seen in boys (63%), whereas the percentage of male children in the whole group was 53%. 7 of the 11 polysensitized children were boys. Children with positive SPTs were significantly older than the children who had no reactions (8.9±2.9 vs. 6.8±3.8 years, p=0.002); this statistically significant difference was seen for both sexes.

RESULTS 2

Table 2 shows the comparison of polysensitized and non-polysensitized children

	polysensitized	Non-polysensitized
n	11	20
Male/female	7/4	12/8
Age (SD)	10,2 (2,5)	10,1 (2,4)
Documented asthma	2	3

Of the 20 non-polysensitized children, 10 had negative SPTs, and 10 had not been tested – sensitization for the latter is in fact not known.

Health care usage was analysed by manually extracting data on health care contacts in primary care and counting coded diagnoses from the J category of the ICD 10 classification, such as J03 (acute tonsillitis), J06 (upper respiratory tract infection) and J45 (asthma).

The polysensitized children had between 9 and 0 documented healthcare contacts, whereas the children from the control group had between 12 and 0 documented healthcare contacts, between 2005 and 2013.
Higher numbers of healthcare contacts were seen in both groups among the children with documented asthma. Non-asthmatic children averaged 3 to 5 healthcare contacts during the analysed time period.

DISCUSSION

Methodical limitations: the dataset on healthcare utilization has certain inherent limitations with regards to completeness and also diagnostic accuracy. One cannot simply assume that a coded diagnosis represents reality. It seemed therefore appropriate to simply count the number of healthcare contacts with diagnostic codes in the categories of interest. A more complete analysis would obviously include looking into health literacy and accessibility of high quality primary care services. These aspects were beyond the scope of our study.

Our data does not permit us to draw firm conclusions about the connection between factors from the home /indoor environment and atopic sensitization and/or development of atopic diseases. Further data analysis and preparation of manuscripts are in progress.

Due to the small numbers in our study we feel unable to draw firm conclusions about the linkage between atopic polysensitization and healthcare usage. At least in our cohort it appeared more obvious that asthma itself was a driver of higher healthcare utilization. Associations between atopic sensitization and development of atopic disease have been the subject of much study. Early polysensitization has been found to be associated with allergic multimorbidity (Gabet et al. 2016). Also there are possibly multiple distinct patterns of sensitization influencing allergic phenotype in a time-dependent manner (Simpson et al. 2010 and Illi et al. 2001).

CONCLUSIONS

Overall, the burden of atopy in the analysed population seemed to be high, and results pointed to unmet medical needs in this disadvantaged and vulnerable population. It would seem prudent to better equip the primary care sector to provide allergologic services to such populations. This needs to incorporate an understanding of health in its social context, and go beyond laboratory testing, as positive test results (SPT or RAST) do not directly translate into disease entities.

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