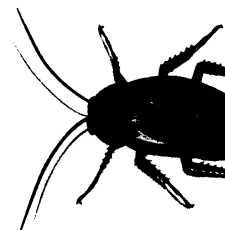


Are cockroaches really harmless?

New evidence on their role in asthma

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Rosenstreich DL, Eggleston P, Kattan M, Baker D, Slavan RG, Gergen P, et al. The role of cockroach allergy and exposure to cockroach allergen in causing morbidity among inner-city children with asthma. *N Engl J Med* 1997;336:1356-63.

Research question

Is there a worse pattern of morbidity and illness severity among asthmatic children living in inner cities in the United States if their skin test results show hypersensitivity to cockroach antigen and they have high levels of cockroach antigen in their homes?

Type of article and design

Prognosis study using a perspective cohort design.

Relevance to family physicians

When we first came across this article, it seemed like minutiae and just of interest to allergists and respirologists. At second glance, it is a very interesting topic, especially to clinicians practising in areas experiencing the increased effect of the broad determinants of health and cockroaches (everywhere?).

Asthma, and particularly the care of more severe asthma cases, is rapidly becoming a serious challenge for primary care physicians. To keep up-to-date for counseling about optimal pharmacotherapy and avoiding precipitants is particularly challenging.

While most of us are aware that poor children, particularly in the inner city, have more asthma, at least in North America, the explanation for this phenomenon is far from simple. Poor physical environments, psychosocial stressors, and less access to or compliance with medical care could all contribute. Consequently, among the various factors that exacerbate asthma in such settings, most of us would not have put cockroaches in the home high on our list of sensitizing agents. Many of us have been unaware of the rapidly growing literature documenting the role of airborne cockroach antigens. Indeed, most of us were taught that cockroaches are not a health hazard at all, even though they are obviously unpleasant.

Yet this article suggests a new class of home environment exposures, which probably should be controlled for children with moderate to severe asthma, difficult as that will be. Perhaps more importantly, this article illustrates how all the broad determinants of health—social, economic, psychological, and physical-environmental—contribute to the genesis and prognosis of asthma, the most common of all potentially serious childhood illnesses.

Overview of study and outcomes

This study reported on 476 of 1528 children with asthma from eight large inner-city areas in the American north-east and midwest. The children came into the study from emergency rooms and clinics, where many of them surely were in the middle of acute exacerbations, which leads to the conclusion that this is largely a study of “bad asthma in bad settings.” But these are just the settings for learning the most about factors that influence outcomes, particularly factors related to the physical and social environment.

The study collected data exhaustively at baseline, including measures of child behaviour and psychopathology in both primary caregivers and children, so that these could be controlled for in analyses attempting to link physical environmental exposures to outcomes. Over the following 9 months, three follow-up interviews gathered information on an exhaustive set of outcomes: hospitalizations, unscheduled medical visits, days of wheezing in the past 2 weeks, nights children lost sleep, days of missed school, and, intriguingly, number of days when caregivers changed plans because of children’s asthma in the past year and number of nights when caregivers lost sleep in the past 2 weeks.

Diaries of peak expiratory flow meter readings were maintained also, although many subjects did not complete these properly and the results were somewhat insensitive compared with the other self-reported morbidity measures collected. The authors used multivariable statistical methods to control for the influence of a variety of asthma prognostic risk factors in order to isolate the influence of hypersensitivity on skin testing to cockroach allergen, dust-mite allergen, and cat allergen in all 476 subjects, and “low” and “high” levels of these allergens in

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vacuum-cleaner-collected samples from 1 m² of each child's bedroom.

Results

After controlling for other asthma prognostic risk factors, including family history and child behaviour, a strong relationship appeared between a high level of cockroach allergen in children's bedroom dust (present in 50.2% of the children's bedrooms), a positive skin test to this allergen, and morbidity due to asthma.

The size of the effect observed was indicated by the unscheduled medical visits of children who were both hypersensitive and exposed: 2.56 per year compared with about 1.4 for children with either low allergen levels in their bedrooms or negative skin test results. Similarly, the first group had 0.37 hospitalizations per child in the past year compared with 0.08 to 0.14 for other children. Virtually every morbidity measure showed a statistically and clinically significantly higher risk of bad outcome in children who were both sensitized and had high allergen levels at home. This was not demonstrated as clearly by dust-mite or cat sensitivity, about which we normally counsel.

Analysis of methodology

This study is a model prognostic cohort study and virtually above reproach in its design and analyses. It has an adequate sample size of the sort of subjects it wanted to study (inner-city children with relatively severe asthma). It turned out, however, that far fewer children had high levels of dust-mite and cat allergens in their bedrooms than expected, so only 15 children, in the case of each allergen (out of 166 in the dust-mite group and 108 in the cat-allergen group) had both positive skin test results and high allergen levels.

Thus, there was a lack of statistical power for detecting relationships between morbidity outcomes and the hypersensitivity and high exposure combination for these two allergens. This is particularly true for the dust-mite allergen, where tabulated results in the study clearly show a large contribution to morbidity from combined high allergen levels at home and positive skin test results, none of which reached statistical significance because of the small sample size. We should mention that studies were generally set in the northern United States, where lower humidity and cooler temperatures would lead to fewer dust mites than in the south but about the same numbers as in Canada.

Application to clinical practice

The importance of this study hinges on two issues: the extent to which we use valid skin testing for children with asthma, particularly those with relatively severe cases

who are not responding to ordinary medication regimens; and the extent to which we can reduce cockroach allergen by usual pest-control measures in the settings described in the paper. While primary care physicians can obviously use skin testing to determine which of their patients have these hypersensitivities (and new practice guidelines cited in the paper¹ recommend this), it is far less clear how we can help patients and their families deal with levels of antigen that are ubiquitous in substandard housing. For example, the editorial² accompanying the paper specifically mentions that air filtering is useless because these particles settle out very quickly.

Some pest-control approaches use relatively nontoxic substances, for example the newer insecticides, such as Avert. It is, however, common knowledge that cockroach control is very difficult in attached housing unless all the units are treated simultaneously. From a practical point of view for practising clinicians, the study documented quite a high level of morbidity among subjects who did not have cockroach allergen hypersensitivity or exposure. Consequently, it is unlikely that controlling this antigen will make a huge difference, important though it might be to the excess of asthma morbidity in disadvantaged children.

Perhaps most striking is the astonishingly high levels of inadequate social support, stressful life events, and psychopathology in caregivers and children documented in this study—all of which obviously can contribute to the prognosis of asthma. All primary care physicians will recognize this global picture of disadvantage as the real challenge, not simply the cockroaches in poor asthmatic children's homes.

Bottom line

Among the multiple difficult-to-control factors that influence the outcome of asthma in children, particularly in poorer communities, we now have one more to worry about: cockroach antigens in the home. For children who have clinically severe asthma, we should have comprehensive skin testing that includes this antigen so that we at least know how hard to push for environmental measures that might help control it. ❖

References

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2. Platts-Mills TAE, Carter MC. Asthma and indoor exposure to allergens [editorial]. *N Engl J Med* 1997;336:1382-4.

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