

Indoor allergens and poorly controlled asthma; A nested case control study

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The case control study is nested within the randomised-controlled Childhood Asthma/ ENT trial in the general practice setting. It is partially funded by the Department of General Practice. The study is collaboration with the Department of Public Health, School of Population Health and Monash University.

Aim

The aim of the proposed study is to investigate the relationship between indoor allergens and poorly controlled asthma in children aged 2 to 14 years. The study will investigate the relationship between residential characteristics (physical indoor environment) and severity of asthma in children aged 2 to 14 years.

Hypotheses

In children with asthma aged 2 to 14 years:

- The homes of children with poorly controlled asthma have higher concentrations of house dust mite allergens compared to the homes of controls
- The homes of children with poorly controlled asthma have higher concentrations of fungi compared to the homes of controls
- The homes of children with poorly controlled asthma have higher concentrations of cat allergen compared to the homes of controls

Project Team

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Rationale

In Australia, asthma is a major health problem with about 2,000,000 Australians being affected. More specifically, asthma affects approximately one in four primary-school age children, one in seven teenagers and one in ten adults.

Indoor allergens may play an important role in the frequency and severity of asthma attacks. In Australian homes, the concentration of house dust mite (HDM) allergens is among the highest in the world (Hill et al, 1997, Dharmage et al 1999a). Over half of the Melbourne homes were found to have hazardous levels of indoor airborne fungi and cat allergen levels of above the proposed threshold for sensitisation to cat allergens (Dharmage et al 1999b). The importance of modifying some residential characteristics in controlling the levels of HDM allergens, cat allergens and indoor fungi have been identified in local as well as international studies (Young et al, 1995; Pasenen, 1992; Wickman et al, 1991, Dharmage et al 1999a, Dharmage et al 1999b).

The association between indoor allergens and asthma is not yet clear. Some epidemiological studies have shown that high exposure to fungal propagules and cat allergen levels is associated with symptoms of asthma [Hu, 1997 #274][Dharmage et al 2000] [Tunnicliffe, 1999 #462] while others have contradicted these findings [Wickman, 1992 #281][Platts Mills, 1995 #246]. High exposure to house dust mite (HDM) allergen levels has been associated with asthma severity in samples of adult asthmatics attending asthma clinics [Tunnicliffe, 1999 #462], [Custovic et al 1996], but not in community based samples (Dharmage et al 2000). These findings indicate that the severity of the disease may modify the association between allergen levels and asthma. Hence, investigation of these associations in asthmatics who represent the severe end of the spectrum of the disease is likely to clarify these associations.

Significance

If indoor allergens are found to influence poorly controlled asthma, the potential for reduction of indoor allergens with intervention is substantial particularly in the study community in the North and North West of Melbourne.

Study Population

The Northern Metropolitan Region was chosen because asthma is one of the priorities identified by three of the four divisions of general practice servicing the area (Northern, North West Melbourne and Central Highlands Divisions of General Practice) (personal communication). The population is multicultural with a substantial proportion (25-48%) from non-English speaking backgrounds. In the most recent survey of this region conducted by the Department of Human Services (DHS) of young people at school (year 7, 9 and 11) 59.8% of students' mothers and 54.6% of students' fathers were born in Australia. The region has the highest rate of mothers (25.9%) and fathers (21.7%) who did not complete high school (metropolitan average is 19.5% of mothers and 16.7% for fathers), and 28% of mothers and 7.6% of fathers are not in paid employment.

The Victorian Burden of Disease study released in January 2001 reveals that asthma is a major cause of morbidity in this area. In Disability Adjusted Life Years (DALYs) rankings for Hume, one of the Local

Government areas covered by this study, asthma is the third highest in females and the fourth in males. Asthma is the second highest cause of Years Lived with Disability (YLD) in this area and in the whole of the NMR it is ranked third and fourth highest for males and females respectively.

Methods

A case-control study will be nested within the current RCT (see attached figure). Cases will be defined as children with asthma whose parents report any admissions to hospital, attendance at emergency departments or unscheduled GP visits for acute asthma management. The controls will be matched with cases on the study arms (intervention or control group) and age. Cases and controls will be identified from the data collected during the current trial. Following approval by the ethics committee, eligible cases and controls will be sent an invitation letter, a consent form and a plain language statement.

A trained research nurse (RN) will then contact interested participants to arrange a home visit at a convenient time. During the home visit the RN will conduct the following:

- Collection of dust samples from the participant's bedroom floor. These dust samples will be analysed for levels of HDM allergens, cat allergens and ergosterol, which is a measure of cumulative exposure to fungi
- Collection of air samples from the participant's bedroom utilising an Andersen sampler. These will be analysed for viable airborne fungal propagules following incubation and culture.
- Complete the 48-item Home Visit Report (Dharmage et al 1999)
- Skin prick tests for the relevant allergens; fungi, cat and HDM

Flow chart for Asthma/ ENT trial and indoor allergens sub-study

