Indirect exposure to cats at school and worsening of asthma in children

M. Wickman

Keywords: Asthma, indoor environment, public places, cat allergens.

Department of Paediatrics, Sachs Children’s Hospital, Karolinska Institute and Department of Environmental Health, Karolinska Hospital, Stockholm, Sweden.

Correspondence: Magnus Wickman, MD, PhD; Department of Paediatrics; Sachs Children’s Hospital; Karolinska Institute; Stockholm, Sweden; e-mail: magnus.wickman@smd.sll.se


Exposure to allergens is a risk for induction of allergic disease. However, for induction of allergic disease other risk factors, besides allergens, need to be prevalent to some extent. Such factors include heredity and other environmental exposure. There are also data suggesting a possibility for the development of tolerance after exposure of high levels of certain airborne allergens such as cat allergen. However, for those already sensitised and with manifestation of allergic disease, exposure to allergens may trigger symptoms or contribute to maintained inflammation of the airways leading to a worsening of the disease.

In Sweden the most common sources of sensitisation are allergens from furred pets and pollen, mostly birch tree and grass pollen. Since ownership of pets is very prevalent in Sweden, in particular in families with small children (around 50%), any direct exposure to furred pets is very common. However, in homes where pets are not kept and also which have no direct contact with pets outside the home, levels of airborne cat and dog allergens can be very high and sometimes of the same magnitude as homes with current or previous keeping of furred pets [1]. This made us focus on the transfer of pet allergen in pet free environments such as furniture stores, day care centres and schools. In a study published in 1998 we demonstrated that pet allergens were prevalent in mattresses in special test rooms where customers could try displayed beds with matching bedding [2]. This made us focus on the transfer of pet allergen in pet free environments such as furniture stores, day care centres and schools. In a study published in 1998 we demonstrated that pet allergens were prevalent in mattresses in special test rooms where customers could try displayed beds with matching bedding [2].

In another study on allergen levels (Fel d 1 and Can f 1) from Swedish day care centres we found significantly lower levels in special day care centres for allergic children, where neither children nor staff were allowed to have furred pets at home. In this study we also demonstrated that the number of children and staff with a cat or a dog at home had a major impact of the allergen levels of such animals found at each day care centre [3].

After this study we considered that a survey was needed to investigate levels and routes of contamination of cat allergen at school and to assess further dissemination of allergens to homes without cats [4]. A recently developed amplified enzyme-linked immunosorbent assay (ELISA) made it possible for us to detect very low levels of cat allergen and to measure airborne levels of allergen in pet free environments by using personal samplers. We identified 82 grade 4-5 classes in northern Stockholm (students 10-12 years of age) of which 12 classes consisted of students with less than 10% cat owners and 17 classes featured frequent cat ownership among the students (> 25%). Finally, six classes with many cat owners and six classes with few cat owners were selected in which airborne cat allergen was collected with personal samplers. We found a 5-fold difference in the median levels of airborne cat allergen between classes with many and those with few cat owners. Besides this we found that allergen levels of non-cat owners’ clothes increased significantly after a school day and that non-cat owners attending classes with many cat owners had higher levels of mattress-bound cat allergen. We considered the cat allergen exposure found in some of the classrooms in this study to be high enough to worsen or to maintain an inflammation in the mucous membranes of the airways and to elicit or aggravate symptoms of asthma. We therefore took the decision to design and conduct a study aiming to elucidate whether children with asthma and verified cat allergy suffered a worsening of their disease when they returned to school after the summer holidays [5].

To study this, we identified 410 children, 6-12 years of age, who were treated for asthma (inhaled steroids and β-agonists), were allergic to cats, and had no cat at home. Peak expiratory flow (PEF),
asthma symptoms, medication, fever and/or sore throat, and contact with furred pets were recorded twice daily during the last week of the summer holidays and the second and third weeks at school. The number of cat owners in each class was recorded. Ninety-two children with asthma reported no contact whatsoever with furred pets during the study period. The children who attended classes with > 18% (median value) cat owners reported significantly decreased PEF, more days with asthma symptoms, and increased use of medication after school started. Those in classes with ≤ 18% cat owners reported no change. Children in classes with many cat owners ran a 9-fold increased risk of exacerbated asthma after school start compared with children in classes with cat owners after adjusting for age, sex, and fever and/or sore throat. This is most likely the result of significant exposure to allergens that give rise to airway inflammation after a period of non-exposure. It would be of considerable interest to look into possible intervening measures, preferably to take steps to minimise the amount of allergen brought to school in cat owners’ clothing, a major source of cat allergen.

References

1. Egmar AC, Emenius G, Almqvist C, Wickman M. – Cat and dog allergen in mattresses and textile floors - pet removal alone results in sustained allergen levels even after several years. Pediatric Allergy Immunology 1998; 9: 31–35.
2. Egmar AC, Emenius G, Almqvist C, Wickman M. – Deposition of Cat (Fel d1), dog (Can f1) and horse allergen over time in public environments. Allergy 1998; 53: 957–961.