

Cat sensitivity: 7-yr audit in children attending a paediatric allergy clinic in North Italy

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Cat sensitivity: 7-yr audit in children attending a paediatric allergy clinic in North Italy. L. Pescollderungg, A. Pietrobelli, A.L. Boner. ©ERS Journals Ltd 2000.

ABSTRACT: Sensitivity to cats and exposure to cat allergen is a common cause of asthma exacerbation in children. To date, there is no data on the prevalence of cat sensitivity in children living in North Italy. Therefore, a 7-yr survey was performed in patients attending an allergy clinic for the first time.

Skin prick tests (SPT) for perennial allergens and for pollens relevant to the region were performed in 4,957 children attending the outpatient clinic 1992–1998. A questionnaire on present or past cat ownership was presented to all cat-skin prick test positive children. An evaluation of cat ownership on the general population was made by telephone interview on a random sample of 1,268 families living in the same area.

With a 3-mm wheal as a positive cut-off 439 (8.85%) children had a positive SPT to cats. Of these 103 (23.4%) had a cat at home and 336 (76.6%) never had a cat in the house. With a greater positive cut-off (a wheal diameter ≥ 4 mm) 140 (2.8%) showed a positive SPT to cats of these 35 (25%) had a cat at home and 105 (75%) had only an indirect exposure to the pet. Of the telephone interviewed families; 16% stated they had a cat at home.

Cat sensitivity is less prevalent in Italy, in this hospital based population, compared with other European countries and this is in agreement with a lower rate of cat ownership. Cat sensitivity was three times more frequent in children who never had a cat at home, than in children living with cats, when the selected positive cut-off was either a wheal diameter of 3 mm or ≥ 4 mm. Thus in a population with a low prevalence of cat ownership public exposure seems to be more important than domestic exposure for the development of sensitivity.

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Allergy to indoor allergens (house dust mites, domestic pets and cockroaches) is a major cause of ill health in children. In the USA, cat and dog allergens sensitivity has been shown to occur in up to 67% of asthmatic children in settings where they are the dominant indoor allergens [1, 2]. In the UK, pet ownership is very common and approximately one-third of homes have a cat and one-quarter a dog [3]. Pets are the second most important cause of allergy in the domestic environment in the UK, and up to 40% of asthmatic children are sensitized to cat and/or dog allergens [4]. In a population survey in Northern Sweden cat and dog allergens elicited the greatest number of positive skin test responses; the proportion of children sensitized against cats was 13.4% and dogs 8.7% [5]. Furthermore, sensitization to cat allergen is common among asthmatic children in Japan where cat-specific immunoglobulin E (IgE) were found in sera of 70% of asthmatic children who kept cats and 34% of patients who had never kept cats at home [6]. In the German Multicenter Atopy Study cumulative rates of sensitization to cat antigen *dI* (*Fel dI*) among children with a family history of atopy were 5–6% in the first 3 yrs of life [7].

Since no data on the prevalence of cat sensitivity in children is available from North Italy, the prevalence of

skin prick test (SPT) positivity to a standardized cat allergen in Italian children attending an outpatients allergy clinic for the first time, was evaluated.

Patients and methods

All the children attending the outpatient allergy clinic, for their first visit, (Dept of Paediatrics, Bolzano Hospital) January 1 1992–December 31 1998 were enrolled in the study. The children were sent to the clinic by the family paediatrician for the evaluation of possible allergy-related symptoms. The children had a clinical evaluation. The diagnosis of asthma was based on symptoms of repetitive wheezing and coughing and responsiveness to inhaled β_2 -agonists and when possible by the demonstration of reversible bronchial obstruction with lung function testing [8]. The diagnosis of allergic rhinitis was based on symptoms of repetitive sneezing, nasal itching, secretion and/or obstruction apart from a cold episode.

SPT for house dust mites, animal danders, moulds and pollen relevant to the region was performed by the same doctor with standardized allergens (Hollister-Stier, Spokane, WA, USA) according to current guidelines [9]. The

results were read 15 min after the test. The largest diameter of the wheal and its perpendicular were measured and averaged. The length of the negative control diameter was subtracted from the wheal diameters caused by the allergens. The reaction was considered positive if the average diameter was ≥ 3 mm when compared to that produced by the negative control. Allergy to cat dander was defined as a positive skin reaction to cat allergen.

The parents of the children who tested positive to cats, with the SPT, were invited to complete a questionnaire concerning past and present ownership. They were asked, if they never or always had a cat in the house, if they had a cat in the past but not in the previous 12 months, and if they had a cat in the last 12 months but not prior to that. Furthermore, in order to evaluate the prevalence of cat ownership in general, a telephone interview was performed on a random sample of 1,268 families, living in the same area, by simply asking whether they had a cat or not at home.

Statistical methods

Data were presented as mean \pm SD. The Chi-squared test was used to verify the differences among groups. All statistical calculations were performed using the Statistical Analysis System (SAS) Statistical software package (SAS, Cary, NC, USA).

Results

A total of 4,957 children were evaluated, 439 (8.85%) had a positive SPT to cats. Of the SPT positive group 336 (76.6%) had never had a cat in the house, 90 children always had a cat, six possessed a cat in past but not in the last 12 months, and seven children had the cat only in the 12 months preceding the visit. Since a vast majority of the children had always had a cat, all these 103 children, directly exposed, exposed in the past or only recently, were considered together. The mean age \pm SD of the children with a positive SPT for cat allergen, who were exposed to a cat at home was 7.93 \pm 3.83 yrs. The mean age of the children with a positive skin prick test, and no cat at home was 7.77 \pm 3.45 yrs).

From the group of 103 patients with a positive SPT for cats and who were exposed to a cat at home, 80 (77.67%) had rhinitis, 45 (43.68%) had asthma, and 38 (36.9%) had both asthma and rhinitis. Of the 336 children sensitive to cats, but never exposed to cats at home, 293 (87.20%) had rhinitis and 166 (49.4%) had rhinitis and asthma. Of these patients 148 (44.04%) had both asthma and rhinitis. There was no significant difference in the prevalence of asthma and/or rhinitis in children sensitive to cats whether or not they had this pet at home (fig. 1). The distribution of positive responses to the other allergens tested in cat SPT positive children, in relation to cat ownership, is reported in figure 2. There was no significant difference between the prevalence of sensitivity to non-cat-allergens in relation to cat ownership. Hence, patients without a cat at home, but showing a positive SPT to cats, did not show a greater prevalence of skin prick test positivity to other allergens.

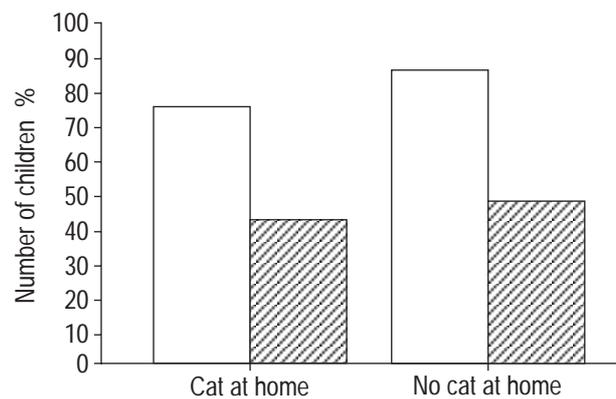


Fig. 1. – Percentage of children sensitive to cat dander with current asthma or rhinitis in relation to cat ownership. □ : rhinitis; ▨ : asthma.

Retrospectively a telephone interview was performed on a random sample of 1,268 families living in the same region as this represented the general population. The interviews revealed a prevalence of 16.08% for cat ownership.

Discussion

This study is a simple audit of the prevalence of SPT response to cat allergens in children attending an outpatient allergy clinic for the evaluation of symptoms possibly related to atopy. However, the results of the study suggest that the incidence of positive SPT to cats, in children aged 4–11 yrs old, is unrelated to current cat ownership in a population with a low prevalence of cat ownership such as those studied in North Italy.

The presence of specific IgE to cat allergen was evaluated with SPT which is the most convenient and common diagnostic tool in clinical allergy diagnosis. For cat allergy it has a high degree of sensitivity and a positive response to SPT has been shown to predict a positive response to a bronchial challenge in 92% of the subjects [10].

The majority of the children allergic to cats had never had a cat at home. It could be argued that a SPT wheal >3 mm when compared to the negative control is too sensitive to detect cat sensitivity. If a 4 mm wheal diameter is used as

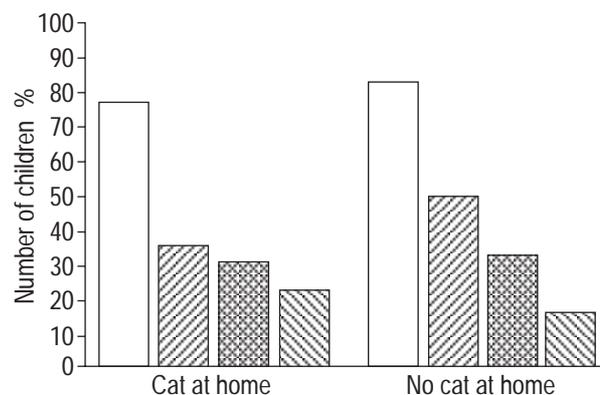


Fig. 2. – Percentage of children sensitive to cat dander with skin prick test positivity and also to other allergens in relation to cat ownership. □ : pollen; ▨ : mite; ▩ : mould; ▧ : other animals.

a positive cut-off, only 140 children (2.8% of the study population) would be sensitive to cats. However, only 35 of these had a cat at home (31 children: always; two children: in the past; and two children: only in the previous twelve months), and 105 children never had a direct exposure. Thus, even with a greater cut-off for positivity, indirect exposure to cats seems to be very important for the development of sensitivity in a population with a low prevalence of cat ownership. In the children, with a positive SPT to cat allergen, the ratio between no cat at home *versus* cat at home was 3:1 when a wheal diameter of either 3 mm or ≥ 4 mm was used as a positive cut-off.

The widespread distribution of cat allergens in both homes and public buildings is well documented [11]. It has been shown that the settled dust samples from classrooms is proportional to the number of cat owners in the room [12, 13] where it is spread through clothing from homes with cats into classrooms [13, 14]. Furthermore, non-cat owners in the classroom with many cat owners have high levels of cat allergen in their clothes, houses and mattresses [13]. Therefore, cat allergens can travel from the clothing of cat owners to those of non-cat owners and diffuse everywhere [11–13]. In the present study, only one-quarter of the children with a cat sensitivity had a cat at home, this was in accordance with a previous study which demonstrated that the minority of children with cat sensitivity had a cat at home [14]. This may have been due to the tendency of parents whose child has a pet sensitivity removing pets from their home. However, this should not be the case in this study, since the parents were not previously aware of the sensitivity of their children and only six children from a total of 439 with cat sensitivity were exposed to cats in the past, but not in the 12 months preceding the visit. It is possible that the exposure to a very high level of allergen, such as those which are commonly observed in houses with a cat, may induce tolerance to cat allergen in some individuals [11]. This may explain the recent observation that children exposed to cats during the first year of life show a lower frequency of positive skin prick tests to cats at the age of 12–13 yrs [15]. Similarly, the presence of a dog in the home during childhood is negatively associated with adult atopy [16]. Moreover, Roost *et al.* [17] pointed out that early child exposure to pets might modulate immunology mechanisms and reduce sensitization to cats in adulthood.

Unfortunately, the questionnaire on cat ownership was only performed by the parents of cat sensitive children. Therefore, it is not known how many children with a cat at home are not sensitive to the cat. A retrospective study, analysing 1,268 randomly selected families, living in the same region was performed by phone calls. A prevalence of cat ownership of 16.08% was found. If this percentage is taken into account also for the present study population, 797 children should have had a cat at home. Therefore, if the 103 children who were SPT positive to cats and had a continuous history of cat exposure at home are excluded, 694 children who did not develop sensitivity to cats remain despite having a direct exposure to the pet. This demonstrates that only one child in every seven/eight with a cat at home seems to have developed sensitivity to the animal. However, the protective effect of cat ownership on the development of cat sensitivity remains speculative in this study since it cannot be assumed that the frequency of cat

ownership was the same amongst the patients as in the public. Furthermore, if this is the case then, it should be true only for a population with a low prevalence of cat ownership.

Conversely, the results for atopic family history were not controlled. The possibility of the relationship between specific sensitization and cat ownership being influenced by families with atopic history keeping pets less frequently needs to be considered. However, this issue should not influence the results of the present study since it is repeatedly observed that in absolute numbers the majority of atopic patients do not come from families with a positive history but from "normal" parents [18, 19].

To conclude, less than 10% of children attending an allergy clinic and living in North Italy showed a positive response to skin prick tests for cat dander. The majority of these children never had a cat in their house, thus public exposure seems to be more important than domestic exposure. Even though cat antigen dI levels in the homes of sensitized subjects were not measured it is apparent that children can be sensitized at very low levels of cat antigen dI which is commonly observed in public buildings and houses without cats. Since the reservoirs of domestic and public allergens may be difficult to eradicate sufficiently to reduce sensitization to indoor allergen and the risk of allergic symptoms, it is important to educate patients not only to avoid distributing allergens but also to comply with pharmacological therapy.

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