

Domestic cat allergen and allergic sensitisation in young children

Chih-Mei Chen^{a,b}, Ulrike Gehring^{a,c}, Magnus Wickman^{d,f}, Gerard Hoek^c,
Mariëlla Giovannangelo^c, Emma Nordling^f, Alet Wijga^e, Johan de Jongste^g,
Göran Pershagen^{d,f}, Catarina Almqvist^{h,i}, Marjan Kerkhof^j, Tom Bellander^{d,f},
H.-Erich Wichmann^{a,b}, Bert Brunekreef^{c,k}, Joachim Heinrich^{a,*}

^aGSF – National Research Centre for Environment and Health, Institute of Epidemiology, D-85764 Neuherberg, Germany

^bLudwig-Maximilians University of Munich, Institute of Medical Data Management, Biometrics and Epidemiology, Munich, Germany

^cInstitute for Risk Assessment Sciences, Utrecht University, Utrecht, The Netherlands

^dNational Institute of Environmental Medicine, Karolinska Institute, Stockholm, Sweden

^eNational Institute of Public Health and the Environment RIVM, Bilthoven, The Netherlands

^fDepartment of Occupational and Environmental Health, Stockholm County Council, Stockholm, Sweden

^gDepartment of Pediatric Respiratory Medicine, Erasmus Medical Center, Sophia Children's Hospital, Rotterdam, The Netherlands

^hDepartment of Woman and Child Health, Karolinska Institute, Stockholm, Sweden

ⁱWoolcock Institute of Medical Research, Sydney, Australia

^jDepartment of Epidemiology, University Medical Center Groningen, The Netherlands

^kJulius Centre for Health Sciences and Primary Care, University Medical Centre, Utrecht, The Netherlands

Received 19 December 2006; received in revised form 25 April 2007; accepted 3 May 2007

Abstract

Studies have presented conflicting associations between cat allergen exposure and sensitisation and atopic disease. We therefore investigated the association between the observed domestic cat allergen level and cat sensitisation in young children in four study populations from three European countries. We recruited children from a nested case–control study, which is composed of four ongoing birth cohorts conducted in three European countries. Children at 2–4 years of age in the four cohorts who were sensitised to cat allergens ($n = 106$) were compared with 554 non-sensitised children (controls). House dust samples were collected when the children were 5 to 7 years old, and cat allergen levels were measured in ng/g dust and ng/m² surface area. In the German study population we found a positive association between domestic cat allergen in house dust and cat sensitisation (OR (CI) = 3.01 (1.16, 7.99)) while in the Swedish study population, we found a negative association (OR (CI) = 0.41 (0.16, 0.98)). No association was found in the Dutch study population (OR (CI) = 0.83 (0.22, 2.93)). Looking into the family history of cat keeping, we found the lowest prevalence of cat sensitisation in children who were cat owners at the age of blood sampling (11%) and the highest prevalence was found in those who have had a cat but not anymore, at the age of blood sampling (41%). The mixed results may be explained by differences in age and avoidance patterns.

© 2007 Elsevier GmbH. All rights reserved.

Keywords: Allergy; Cats; Cat allergen; Children; Cohort study; Sensitisation

*Corresponding author. Tel.: +49 89 3187 4150; fax: +49 89 3187 3380.

E-mail address: joachim.heinrich@gsf.de (J. Heinrich).

Introduction

A number of epidemiological studies have shown conflicting results on the influence of cat ownership and cat allergen exposure in early life on the subsequent development of sensitisation and allergic disease (Brussee et al., 2005; Custovic and Woodcock, 2001a; Lau et al., 2000; Svanes et al., 2003; Wahn et al., 1997). The German Multi-Centre Allergy Study (MAS) reported a dose–response relationship between early cat allergen exposure and specific sensitisation to cat in children up to 3 years old (Wahn et al., 1997). The Dutch Prevention and Incidence of Asthma and Mite Allergy Study (PIAMA) also suggested an increased risk at age 4 (Brussee et al., 2005). A cross-sectional study in school age children in the US showed an inverse u-shaped association between indoor cat allergen exposure and cat allergen sensitisation (Platts-Mills et al., 2001). This finding was interpreted as showing that extremely high cat allergen exposures may induce immune tolerance which involves the induction of IgG4 antibodies to cat allergen. Some studies, however, reported that the observed protective effect may be partly due to selective cat avoidance by atopic parents (Almqvist et al., 2003a; Nafstad et al., 2001) or cat removal in families with sensitised children (Anyo et al., 2002; Brunekreef et al., 1992). There are also studies reporting no association between cat allergen exposure and the development of cat-specific sensitisation (Cullinan et al., 2004; Munir et al., 1997).

Discrepancies between studies may be due to different study designs, study populations, levels of exposure, and definitions of allergic sensitisation. Svanes et al. (2003) reported results from a large-scale European survey suggesting that the effect of domestic cat allergen exposure during childhood on allergic disease in adulthood may be modulated by the community prevalence of cats. Components of indoor dust other than cat allergen may also have immune-stimulating properties. Exposure to indoor bacterial compounds such as endotoxin, in early life, was suggested to provide protection against the development of allergic disease (Williams et al., 2005). Expressions of cat allergen level also vary between studies. Most of the studies expressed the level of indoor cat allergen exposure using the allergen concentration in settled dust, which is the amount of allergen per gram of sampled dust (Custovic et al., 2001b; Lau et al., 2005; Platts-Mills et al., 2001). A few studies reported their results using surface allergen load, the amount of allergen per m² of sample surface (Brussee et al., 2005; Douwes et al., 2000; Fahlbusch et al., 2002) and it has been argued that surface load is a better indicator as it takes into account the amount of dust present at the sampling sites (Couper et al., 1998).

As part of the “Effects of outdoor and indoor air pollution on the development of allergic disease in children” study (AIRALLERG study), we investigated the associations between domestic cat allergen levels and cat sensitisation in pre-school children in four study populations from three European countries.

Methods

Study design

The AIRALLERG study was a nested case–control study composed of four ongoing birth cohorts conducted in three centres. The GINI (von Berg et al., 2003) and LISA (Heinrich et al., 2002) cohorts were based in Germany, the PIAMA cohort (Brunekreef et al., 2002) in the Netherlands, and the BAMSE cohort (Wickman et al., 2002) in Sweden. Based on serum IgE determinations all children who were sensitised to common inhalant allergens, and some who were sensitised to common food allergens were invited to participate in the AIRALLERG study. Equal numbers of non-sensitised random controls were also selected from the four cohorts. Three hundred and fifty-eight, 347, and 364 subjects from Germany, the Netherlands, and Sweden, respectively, were recruited. In this paper the study population included those children who were not sensitised to any common allergens (controls, $n = 554$) and those children who were sensitised to cat allergens ($n = 106$). Baseline information of the participants was extracted from the existing database of the four cohorts. The study was approved by local ethics committees.

Serum assays

Blood samples were taken when the children were 2 (LISA), 3 (GINI), and 4 years old (the Dutch and Swedish cohorts). In the AIRALLERG study, sensitisation was defined as having a specific serum IgE titre >0.35 kU/l to one or more common inhalant or food allergens. In the Dutch centre, IgE antibodies to common allergens were measured using a radioallergo-sorbent test according to the standard operating procedure used at the Sanquin Institute (Stapel et al., 2004). In the German and Swedish centres, the Pharmacia UniCAP system was used (Phadia AB, Uppsala, Sweden). Common allergens tested in each original cohort were slightly different as each cohort had its own protocol adapted to locally most prominent allergens. In the LISA cohort, mixed food allergens food mix fx5[®] (egg white, milk, fish, wheat, peanut, soy bean), mixed inhalant allergens house dust mix hx2 (*D. pteronyssinus*, *D. farinae*, and German cockroach), cat, mould mix mx1 (*Penicillium notatum*, *Cladosporium*

Download English Version:

<https://daneshyari.com/en/article/2589255>

Download Persian Version:

<https://daneshyari.com/article/2589255>

[Daneshyari.com](https://daneshyari.com)