

Childhood eczema and household pets: a literature review

Kam Lun Hon¹ · Yin Ching Kathy Tsang¹ · Nga Hin Henry Pong¹ ·
Ting Fan Leung¹

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Abstract Many parents seek healthcare advice regarding whether keeping a household pet may be detrimental to the health of children with atopic eczema. Based on an extensive literature review, this article summarizes the evidence for recommendations regarding pets in households with children with eczema. The majority of studies did not provide definitive evidence on whether or not families with children with atopic eczema should get rid of their pets. The severity of atopic eczema and health-related quality of life do not directly correlate with skin sensitization to cats or dogs. Sensitized patients, especially those with concomitant asthma and severe symptoms, may consider non-furry pet alternatives if they plan to have a pet. Given the lack of good evidence, highly sensitized individuals, particularly those with asthma comorbidity, may need to remove their pet for a trial period to determine if symptoms improve in the absence of their pet.

Introduction

Atopic eczema (atopic dermatitis) is a complex chronic relapsing disease in children associated with significant impaired health-related quality of life (HR-QOL) [1–3]. The disease is associated with personal and family histories of atopic diseases, and involves many underlying

pathophysiologic immune mechanisms [3–5]. As there is no definite cure, alternative therapies are extensively practiced by parents of children with eczema.

As allergens may be involved in its pathophysiology [6–9], a holistic approach to treatment should include the avoidance of potential or known allergens. Physicians caring for these patients must explore potential allergens and offer sensible recommendations to the anxious and often confused parents. As food allergens have been implicated in the development of eczema in children, many parents try to avoid such allergens via dietary restriction and avoidance [10–12]. Sensible avoidance of foods known to exacerbate sensitized individuals is reasonable health-care advice.

Although less commonly suspected, aeroallergens have also been implicated in eczema pathophysiology. Among these are the common dust mites, the presence of which has been shown to correlate with eczema severity [6]. However, the association between household pets, such as cats and dogs, and eczema is controversial. Generally, household pets are associated with airway allergies, but their roles in eczema are ambiguous and less well characterized [13–17]. One study showed exposure to cats during early childhood may be associated with eczema non-remission, but there was no such association with dogs [18]. In addition, having a household pet was positively associated with eczema in preschool children [19]. Many anxious parents of children with eczema may consult their physicians regarding whether they should remove their family pets (primarily cats or dogs) from the home. The physician's advice may have important psychosocial implications, as it may involve taking away a favorite member of the family. We performed an extensive literature review to find recommendations regarding keeping household pets in families with children with eczema.

✉ Kam Lun Hon
ehon@cuhk.edu.hk;
ehon@hotmail.com

¹ Department of Paediatrics, The Chinese University of Hong Kong, 6/F, Clinical Sciences Building, Prince of Wales Hospital, Shatin, Hong Kong SAR, China

Methods and results

We performed an extensive Medline search. As of February 2015, using the search terms "atopic eczema" and "pets" or "cats" or "dogs" on PubMed Clinical Queries, 12, 9 and 21 "Systematic Reviews" and 15, 20 and 87 "Medical Genetics" articles were identified, respectively. These papers, together with their references, were evaluated as a basis of evidence for recommendations regarding the keeping of pets in households with children with eczema.

Many of these identified papers were irrelevant to our subject matter, with only 14 papers being considered relevant (Table 1). The relevant papers included systematic reviews, cross-sectional studies and cohort studies, with the majority of studies being conducted in Caucasian populations (Table 1). The literature review covers primary prevention (i.e. pre-eczema; $n = 7$ papers), as well as disease severity, quality of life, and exacerbation following disease onset ($n = 7$ papers). Good-quality randomized controlled trials on the subject matter are lacking.

Following eczema onset

In children with eczema, there is no good evidence that a family cat or dog may be beneficial or detrimental in terms of eczema severity or HR-QOL. Several studies demonstrate that disease severity is generally unrelated to cat or dog sensitization (Table 1) [6, 25, 26]. However, one study showed disease severity is correlated with skin sensitization with cat only in filaggrin-related atopic dermatitis, but not in non-filaggrin atopic dermatitis [27]. Furthermore, another study showed that having a cat at home is associated with eczema [26], nevertheless, three other studies showed an association between having a cat and airway allergies, but no association with eczema [28–30].

Pre-eczema

In pre-eczema stage, the literature is equally conflicting (Table 1). Some show that dog exposure may be protective and cat exposure may increase risk of subsequent development of eczema, whereas others show the opposite consequence or no association at all. In general, research is

focused more on airway allergies than eczema. For example, allergic rhinitis is associated with cat contact at home during first year of life [31]. Cat exposure had a strong and independent effect to reduce the risk of developing asthma across all analyses (odds ratio 0.16; 95% CI 0.05–0.53). Conversely, dog, mouse, rat, and cockroach exposures did not significantly influence the subsequent development of asthma [16]. The available literature is too ambiguous to allow firm conclusions to be drawn (Table 1). Therefore, clinicians should discuss management and expectations openly with patients, while recognizing the need for further investigation into the hygiene hypothesis as it relates to atopic eczema.

Discussion

Atopic eczema is a common chronic childhood disease associated with a lot of myths and fallacies regarding its management. The filaggrin null mutation concept is important in explaining the skin barrier pathophysiology in some, but not all, patients [20–22]. The hygiene theory and the allergy Th1/Th2 paradigm give conflicting messages in terms of atopy pathogenesis [5, 23]. Too much or too little exposure of common household allergens at the wrong time of life may introduce allergy or aggravate allergy.

Anxious parents of children with eczema often receive conflicting health advice whether they should get rid of their family cat or dog in order to reduce allergen exposure. They may seek advice as to what household pets to choose. Pet-keeping practices are cultural and may vary from country to country [6, 24].

However, the majority of studies do not provide definitive evidence on whether or not families with children with atopic eczema should get rid of their household pets. There is no direct correlation between atopic eczema severity or HR-QOL with skin sensitization to cats or dogs. Sensitized patients especially those with concomitant asthma and severe symptoms may consider non-furry alternatives if they plan to have a pet. Given the lack of good evidence, highly sensitized individuals, especially those with asthma comorbidity, may need to remove their pet for a trial period to determine if symptoms improve without the presence of the pet.

Table 1 Results of systemic reviews, meta-analyses, and selected cohorts on household pets and childhood eczema

Study	Design	Conclusions
After eczema onset		
4039 individuals in two birth cohorts (Caucasian) [18]	Systematic review	Eczema non-remission was associated with exposure to pets during early childhood [cats OR 2.33 (95% CI 0.85–6.38); dogs not significant]
12 patients (Japan) [27]	Cohort	A significant correlation between the objective SCORAD and specific IgE for house dust ($r = 0.66$, $p < 0.05$), mite allergen ($r = 0.53$, $p < 0.05$), and cat dander ($r = 0.64$, $p < 0.05$) in FIL-related AD, but not in non-FIL AD
946 children (Iceland) [25]	Cohort	Current cat or dog ownership or having a cat or a dog during the first year of life had no relationship with signs of eczema on inspection at the age of 10–11 years
1402 children (Italy) [26]	Cross-sectional	Allergic sensitization to egg, cat, grass pollen and mites, as well as the presence of symptoms of rhinitis and a positive family history of atopy, were all significant risk factors for AD
119 children (China) [6]]	Cohort	Atopy to cat and dog was not associated with eczema severity Sensible to advise parents on specific avoidance strategies only if children are severely affected, have a definitive history of eczema exacerbation by specific aeroallergens and are not responsive to conventional treatment
2201 children (East Germany) [32]	Cross-sectional	Significant associations between the severity score of eczema and concentrations of allergen-specific IgE to dust mite ($p = 0.032$) and cat ($p = 0.014$) allergens after adjustment for sex, age, location, and parental predisposition
2200 children (East Germany) [33]	Cohort	Atopic eczema was significantly more frequent in predisposed families and those who reported keeping guinea pigs (OR 4.37, 95 % CI 2.15–8.91), but not dogs, cats, and hamsters
Pre-eczema onset		
26 publications from 21 birth cohort studies (Caucasian and Japanese) [34]	Meta-analysis	A favorable effect of exposure to dogs and pets on the risk of eczema in infants or children Exposure to dogs decreased eczema risk of eczema in children by $\approx 25\%$ No association emerged with exposure to cats
49 studies (mainly Caucasians) [35]	Systematic review	Eczema risks reduced by dog exposure in early life, and increased by cat exposure in the presence of skin barrier impairment
762 children (USA) [36]	Birth cohort	Protective role for risk of eczema for early exposure to dog in high risk children, especially among those carrying the CD14-159C/T SNP
882 high-risk patients (Denmark and UK) [37]	High-risk birth cohorts	Cat, but not dog, ownership substantially increases the risk of eczema within the first year of life in children with FLG loss-of-function variants
8 cohort and 4 cross-sectional studies (Caucasian) [38]	Systematic review	Previous exposure to cats (pooled OR 0.76; 95% CI 0.62–0.92), dogs (pooled OR 0.68; 95% CI 0.53–0.87), or ‘any furry pet’ (pooled OR 0.79; 95% CI 0.74–0.84) is associated with a lower risk of eczema, which might be explained by avoidance behavior in high-risk families Generally no clear evidence that early pet exposure is associated with increased risks of subsequent eczema
285 patients (USA) [39]	Cohort	Having a dog in infancy is associated with higher IL-10 and IL-13 cytokine secretion profiles and reduced allergic sensitization and AD
2531 children (Norway) [40]	Birth cohort	Eczema risks reduced with exposure to any pet (adjusted OR 0.7; 95% CI 0.5–0.9), to cats (adjusted OR 0.5; 95% CI 0.3–0.9) and to dogs (adjusted OR 0.7; 95% CI 0.4–1.0) Associations were strongest in children of atopic parents

AD atopic dermatitis, AE atopic eczema, FLG filaggrin, IgE immunoglobulin E, IL interleukin, OR odds ratio, SCORAD Scoring Atopic Dermatitis, SNP single nucleotide polymorphism

Compliance with ethical standards

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Conflict of interest Kam Lun Hon, Yin Ching Kathy Tsang, Nga Hin Henry Pong, Ting Fan Leung declare that they have no conflicts of interest

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