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Research Article

House dust mite specific in vitro IgE determination in cats with allergic dermatitis

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ABSTRACT

The purpose of this retrospective research was to verify underlying causes of clinical findings in cats with allergic dermatitis. Allergen specific immunolglobulin E (IgE) concentrations against *Dermatophagoides farinae* and *Dermatophagoides pteronyssinus* were determined by use of in vitro Polycheck Veterinary allergy tests. Total of 33 cats were referred to clinic with primary/secondary skin lesions or to those of general health status checkup. On initial referral available haematological, microbiological, parasitological and relevant tests were performed. Nineteen cats were deemed healthy based on relevant analysis (neither infection nor hypersensitivity) were enrolled as a control group. Other 14 cats were composed of allergic cases. Regarding allergen specific IgE levels (kU/l) in allergic cats, in vitro tests gave a positive reactions for *D. farinae* [class 3,4 (n=1), class 2 (n=7), class 1 (n=6) and class 0 (n=0)] and D. pteronyssus [class 3,4 (n=1), class 2(n=5), class 1(n=4) and class 0 (n=4)] in whom at least 1 antigen was detected in all allergic cats. There was a statistical significance for specific IgE levels between healthy controls and allergic cats against house dust mites 0.21±0.018 vs. 4.69±1.49 (kU/l) for *D. farinae* (p=0.0001) and significant alterations between healthy and allergic cats 0.21±0.023 vs. 3.11±1.21 (kU/l) (p=0.003) for D. pteronyssus. In this study, all positive reactions on the allergy test were suggested to present underlying house dust allergens of dermatitis in enrolled cats. As far as well-known factor that in vitro allergy tests solely might not be reflecting hypersensitivity from healthy cases because of non-unique clinically findings.

Alerjik dermatitli kedilerde ev tozu akarlarına spesifik in vitro Ig E düzeylerinin araştırılması

ÖZ

Bu retrospektif araştırmanın amacı, alerjik dermatitli kedilerin klinik bulgularının altında yatan nedenleri tespit etmektir. *Dermatophagoides farina* ve *Dermatophagoides pteronyssinus*'a karşı alerjen spesifik Ig E konsantrasyonları, in vitro Polycheck Veteriner alerji testleri kullanılarak belirlendi. Primer / sekonder deri lezyonları olan veya genel sağlık durumu kontrolü için gelen toplamda 33 kedi çalışmaya alındı. Öncelikle mevcut hematolojik, mikrobiyolojik, parazitolojik ve ilgili analizler yapıldı. On dokuz kedi, ilgili analize dayalı olarak sağlıklı kabul edildi (ne enfeksiyon ne de aşırı duyarlılık gelişmiş) kontrol grubu olarak kaydedildi. Diğer 14 kedi alerjik vakalardan oluşuyordu. Alerjik kedilerde alerjene spesifik IgE seviyeleri (kU / l) ile ilgili olarak, in vitro testler, *D. farinae* için [sınıf 3,4 (n = 1), sınıf 2 (n = 7), sınıf 1 (n = 6), sınıf 0 (n= 0)] ve *D. pteronyssinus* için[sınıf 3,4 (n = 1), sınıf 2 (n = 5), sınıf 1 (n = 4) ve sınıf 0 (n = 4)] pozitif reaksiyonlar verdi. Bütün alerjik kedilerde en az 1 antijen saptandı. Sağlıklı kontrol grubu ve alerjik kediler arasında ev tozu akarlarına karşı spesifik Ig E seviyeleri için istatistiksel olarak anlamlı bir farklılık mevcuttu; *D. farinae* için 0.21 ± 0.018'e karşılık 4.69 ± 1.49 (p = 0.0001) ve *D. pteronyssinus* için 0.21 ± 0.023'e karşılık 3.11 ± 1.21 (p = 0.003). Bu çalışmada, Polycheck alerji testindeki tüm pozitif reaksiyonların, kayıtlı kedilerde dermatitin ev tozu alerjenlerini gösterdiği öne sürülmüştür. İyi bilindiği üzere, in vitro alerji testleri tek başına bir örnek olmayan klinik bulgular nedeni ile hipersensitivite durumunun tespitine yönelik sağlikli hayvanlardan ayrim yapmamaktadir.

INTRODUCTION

Feline atopy [synonym "non-flea non-food allergic dermatitis" as well as "feline atopic dermatitis"] a frequently recognized type 1 hypersensitivity reaction in relation with the existence of circulating/skin-fixed IgE antibodies which are specific to environmental allergens (1, 2). Feline atopy has been denoted as one of the most common allergy in cats (3). Growing interest has been aroused for the similarities of atopy in humans, dogs and cats. Similar to canine atopic dermatitis, feline atopy might be triggered by IgE reaction to environmental allergens, such as house dust mites (4,5) whereas allergen-specific IgE concentrations do not differentiate normal or atopic cats (6). In the present study the researcher group hypothesized that house mites might trigger clinical signs to those of allergic cats, in which specific IgE analysis deemed available by in vitro allergy tests.

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MATERIAL and METHODS

Demographic data. Serum samples from allergic cats (n=14) ages of 1 to 10 years, of both sexes (7 male, 7 female) were obtained. The retrospectively diagnosed cats (as brought to the clinic by the owners) with primary/secondary skin lesions were included To those of diseased cats primary skin lesions involved vesicules (n=4) and urticaria (n=2), whereas secondary lesions comprised desquamation (n=9), scaling (n=8), crusting (n=11) and alopecia (n=11) in the study. Enrolled cases had neither prior diagnosis nor therapeutical intervention. Vaccination schedule, anti-parasitic management had already been performed on all cats. Other 19 [11 male and 8 female] denoted and analyzed as healthy cats were enrolled as a control group. The cats composed of healthy group also had health certificates. Vaccination status, deworming schedule, complete physical examination and relevant hematological and serum biochemistry analysis (data not necessary to shown) deemed healthy condition. Written owner consents were obtained from the owners. Healthy cats were only deemed available as if there was no existing allergy sign (i.e. pruritus) or gastrointestinal/respiratory signs (7). Differential diagnosis included a) parasitic (skin scraping, acetate tape impression) diseases, b) mycotic (Wood's lamp examination, mycological isolation and identification) or autoimmune conditions (skin punch biopsy and cytology), c) hypersensitivity dermatitis (HD) [in relationship with food allergens, a 6- to 8-week restriction of diet were all carried out, as described previously (1,5,7,8,). Serum biochemistry, hematological results, (data not shown) clinical examination and those suspected to be sensitive against environmental and/or food allergens were included (9). The present study was supported by Aydin Adnan Menderes University Research Funding Unit (ADU-BAP) with project no:VTF-18040.

Polycheck Feline Allergy Test principle. This relatively non-invasive (Polycheck, Allergy test, Gmbh, Germany, Distributer RDA Group, Istanbul) has been conducted at the University of Adnan Menderes, Faculty of Veterinary, Department of Internal Medicine for a long while in which several dogs and cats had been tested and analyzed. Within the present study supported by Adnan Menderes University Research Funding Unit with Project no:VTF-18040, feline specific test kits were allowed and used. This in vitro test is capable of detecting allergen-specific IgE in cat serum via an immunoassay principle by use of coated allergens and biotinylated monoclonal antibodies against cat IgE. The steps included initial incubation, washing step followed by washing [the enzymes cause a coloured precipitate, is linked to the specific IgE levels found in the serum] and calculation of results (10). A well and constantly working computer, with a scanner and a Biocheck Imaging Software were available for interpretation of the test results. The cassettes were then placed onto the scanner, for interpretation and written report. The concentrations of allergen-specific IgE for house dust mites were given as relative kilo units per liter (kU/l) and classified according to the manufacturer and previous researches.

Statistical analyses. Descriptive statistics of mean and standard deviations of animals were performed in pruritic and healthy groups. The Mann-Whitney U test was used to determine the differences between the groups. A value of $p<0,05$ was stated as significant.

RESULTS

The results were shown in bar graphic and available statistical analysis as shown above in Fig.1 and table 1. Polycheck in vitro allergy test involved 20 different allergens [D. farinae, D. pteronyssinus, Malassezia, Lepidoglyphus, Aspergillus/Penicillium, Alternaria/Cladosporium, Ragweed, Birch/Alder/Hazel, Plantane/Willow/Poplar, Parietaria, Rye Pollen, Grass-Mix, Stinging nettle, Lambs quarter, Plantain, Mugwort, Sorrel, Acarus siro, Tyrophagus, Flea (Ctenoceph.). In the present study although all aforemenentioned allergens were analysed in parallel line within the purpose of the study and the project solely included house-dust mites were shown. Briefly storage mites (Lepidoglyphus, Acarus siro, Tyrophagus) were detected in 3,2 and 1 cats respectively. IgE against Flea was detected in 4 cats. On the other hand, regarding allergen specific IgE levels (kU/l) in allergic cats, in vitro tests gave a positive reactions for *D. farina* (DF) [class 3,4 (n=1), class 2 (n=7), class 1 (n=6) and class 0 (n=0)] and *D. pteronyssus* (DP)[class 3,4 (n=1), class 2 (n=5), class 1(n=4) and class 0(n=4)] in whom at least 1 antigen was detected in all allergic cats. There was a statistical significance for specific IgE levels between healthy controls and allergic cats against house dust mites 0.21±0.018 vs. 4.69±1.49 (kU/l) for *DF* (p=0.0001) and significant alterations between healthy controls and allergic cats 0.21±0.023 vs. 3.11±1.21 (kU/l) (p=0.003) for *DP*.

Table 1. Allergen specific (house dust mite) IgE concentrations among healthy and diseased cats.

	Healthy	Patient	P
D. farinae (kU/l)	0.21 ± 0.018	4.69 ± 1.49	**0.0001**
D. pteronyssinus (kU/l)	0.21 ± 0.023	3.11 ± 1.21	**0.003**

Available dermatological photos within the analysis of in vitro tests were shown in fig.

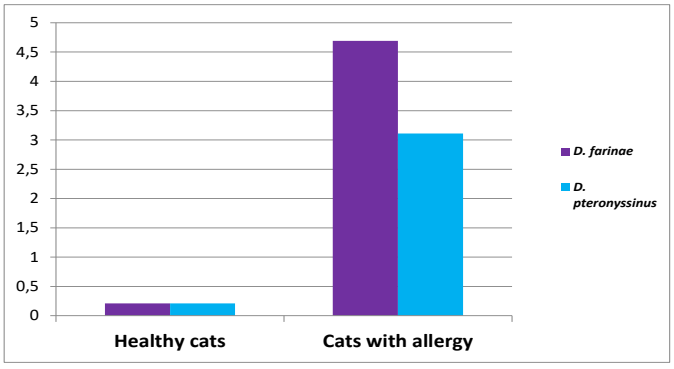

Figure 1. Bar graphic presentation of house dust mites among healthy and diseased cats.

DISCUSSION

Atopic dermatitis, as aforementioned above could be denoted as a skin disorder in relation with hypersensitivity against environmental allergens (11). In the present study two major environmental allergens, *D. farinae* and *D. pterynossinus* were involved and analyzed, in which at least one of those frequent allergens were detected in all cats. It has been well known that a genetic predisposition (12) related to atopy was recognized in the vast majority of cats at the age of 6 months to 3 years (13,14). In the present study an age range of 1 to 10 years were detected whereas 3/4 of the diseased cats were under 4 years of age, in association with the latter literature.

In the vast majority of cats with presumed allergy itching, miliary dermatitis and eosinophilic granuloma (11,13,15,16) might be detected. Classical dermatological signs exist on the head and neck regions (11), in which more than 1/2 of the cats presented head and neck region lesions, mostly crusting and scaling. Apart from that except 1 case, all diseased cats presented pruritus. Although all cats were presumed atopic, due to lack of general diagnostic criteria permitting a diagnosis based on the clinical signs (17) and no unique diagnostic test is capable of reliable diagnosis for feline atopy; diagnosis in this study were composed of suggestive historical data, clinical signs, and above mentioned (at material and methods section) the exclusion of other causes.

House dust mite (HDM) allergens (HDMAs) have long been involved as responsible etiological agents for allergy among humans and animals. In a cat population of 58 ones with atopic dermatitis, to those of 52 non-allergic cats involving 26 specific pathogen-free (SPF) cats, concentrations of serum IgE specific for the house dust mites (HDMs) *D. farinae* (DF) and *D. pteronyssinus* (DP) were analyzed by use of a monoclonal anti-IgE enzyme-linked immunosorbent assay. In that study SPF cats presented significantly lower levels of HDM-specific serum IgE in contrast to cases with allergic dermatitis and non-allergy (18).

Obtained data showed that DF [native form] could be an important allergen in cats with allergic dermatitis, whereas the clinical significance of those reactions needs to be analyzed in detail (18). In another prior research HDMAs were detected in cat-associated household microenvironments. From 50 cat-only households with 95 cats, dust samples, by use of by vacuuming from areas where cats slept/rested, were analyzed via ELISA for Der p 1, Der f 1 and HDM group 2 allergens. Out of 50 households 38 were greater than 2 micro gr (-1) of dust for at least one HDMA (19).

Latter data should lead to further determination of the role of HDMs in cats suffering from putative allergic conditions such as atopic dermatitis or asthma (19). In the present study a statistical significance for specific IgE levels between healthy controls and allergic cats against house dust mites 0.21±0.018 vs 4.69±1.49 (kU/l) for *D. farinae* (p=0.0001) and significant alterations between healthy controls and allergic cats 0.21±0.023 vs 3.11±1.21 (kU/l) (p=0.003) for *DP*. (p=0.003) for *D. pteronyssus*. It should be further claimed that house dust mites should be taken into consideration within the allergic cats, at least for this study, and necessary precautions should be taken. In addition preventive measures comprising thorough vacuuming on house dust organisms and mite allergens, specifically the objects in contact with the cat (i.e. cotton carpets, playground etc.) might be vacuumed every other day, along with anti-mite repellent sprays.

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