

Cat allergen sensitization which clinical allergies are commonly associated? A retrospective study (Saudi Arabia)

Moufag Mohammed Saeed Tayeb

Abstract

Background: Cat allergen sensitization (CAS) is common indoor problem. Its prevalence is increasing worldwide. Other indoor allergens are: mites, mold and cockroach.

Objective: To define the correlation between CAS and allergic diseases (ADs) in Jeddah-Saudi.

Methods: A research conducted during 2020 in private clinic (Jeddah – Saudi). Data were extracted retrospectively from patient files. SIgE in vitro blood test results of positive CAS for 110 patients were included. Additionally, positive sIgE results of other inhalant allergens were taken. Furthermore, clinical allergic diagnoses were extracted. All data were filled in excel sheet. Afterward, five tables were concluded.

Results: Sample was 110 patients with positive CAS results. Females were 60 (54%) while males were 50 (46%). Adult and middle ages were the most common to have CAS: 37 (34%) in age period between 30-40 years, 23 (21%) in age period between 20-30 years. Commonest ADs associated with CAS are allergic rhinitis and sinusitis as 59 (53%). 2nd common group associated with CAS are: atopic dermatitis 25 (23%), asthma 20 (18%), urticaria and angioedema 15 (14%). House dust mites are the commonest inhalant allergens associated with CAS: dermatophagoides farina (DF) 53 (48%), dermatophagoides pteronyssinus (DP) 52 (47%), followed by dog 42 (38%), hoarse 40 (36%), cockroach, aspergillus 39 (35%), alternaria 38 (34%), cladosporium 35 (32%). Most sever allergen associated with CAS is camel as 4.3 class, followed by DP 2.2, cat, DF 2.1 and cockroach 2.

Keywords: Cat allergy; Cat sensitization; Asthma; Allergic rhinitis; Sinusitis; Atopic dermatitis; Atopy

Introduction

Highlights Box

1. What is already known about this topic?

-cat dander is a protein which can trigger allergies

-inhalant allergens are spread everywhere

-but more to be indoors

2. What does this article add to our knowledge?

-adult and middle ages are the commonest to have cat CAS

-respiratory allergies are the commonest association with CAS

-Indoor allergens are the commonest association with CAS

3. How does this study impact current management guidelines?

-cat sensitizations, allergies are common in Saudi

-removal of cats is advised for sensitized adults

-avoiding other indoor inhalant allergens is advisable in atopic persons

Introduction

Allergy is a chronic inflammatory process. Unfortunately, there is an underdiagnoses and undertreatment of allergies due to many reasons. That's why most of allergy cases aren't diagnosed nor treated properly. Additionally, impact of allergies on patient's life is large because of its high morbidity. It can cause frequent absence from work and schools. Moreover, allergy can decrease concentration and academic performance. Furthermore, allergies put a huge pressure on finance. It can affect many organs like: eye, nose, sinus, lung, skin and gastrointestinal tract.¹

Inhalant allergens are two types: indoors (inside homes) and outdoors (outside homes). Indoor allergens are the most common to trigger allergies because we spend most of our times inside homes. Indoor allergens are: house dust mites, molds, cockroaches and animals. Animals are an important source of indoor allergens like cats and dogs.

Moufag Mohammed Saeed Tayeb, University of Jeddah, Saudi Arabia

Corresponding author: Moufag Mohammed Saeed Tayeb,
Personal e-mail: moufagta@yahoo.com; Official e-mail: mmtayeb@uj.edu.sa

In Saudi, cats are more common than dogs as a source of indoor allergens because of its indoor adoption. This habit is widespread in Saudi science longtime. Outdoor allergens are pollens: trees, weeds and grasses.²

Globally, prevalence of CAS is increasing. Its prevalence differs from country to another. Generally it can be assumed that CAS prevalence is around 25th of the total allergy cases which visit allergist clinics. In a recent study in Spain, it was shown that 26% of adults are sensitized to cats. In USA in another study it was nearly the same. In Saudi, CAS prevalence may be more. This means that CAS is a global health problem and needs more time and care.³

Cross reactivity means that the epitopes of two different allergens are similar. That's why patients may have symptoms after exposure to one epitope while they are not allergic to it just because they are allergic to the other one. Epitopes of dogs and cats are similar and have cross reactivity between them: cat (lipocalin Fel d 7), dog (lipocalin Can f 1). Allergy tests (either in vivo or in vitro) are the beneficial tools we have to differentiate that the patients are allergic to which allergen of them.⁴

Methods

This research was done during February 2020 in allergy clinics (Jeddah – Saudi). Data was extracted retrospectively from patient files. Positive in vitro sIgE results to cat allergen were included. Sample size was 110 patients: 50 (46%) males, 60 (54%) females. Additionally, positive sensitization results to other inhalants were included. The aim is to define which inhalants are commonly associated with CAS in Jeddah-Saudi. RAST is ELISA in vitro blood test which can detect sIgEs to common inhalants and food allergens.

Moreover, allergic clinical diagnoses of each 110 cases were registered. The goal is to determine which ADs are commonly associated with CAS in Jeddah-Saudi. Allergen sensitization results alone aren't enough because sensitization can be silent with no symptoms. The professional way is to combine sensitization results with the clinical context. This is the difference between atopy which is a silent pathology and the clinical allergy.

Results were collected in excel sheet and tables were extracted. Tables 1 and 2 were about gender and age distribution of CAS cases. Table 3 was about the ADs which are associated with positive CAS results. Table 4 was about the frequency of positive sensitizations for each inhalant allergen. This will clarify which inhalant sensitization is more frequent. Table 5 was about inhalant allergens severity. This can explain which allergen sensitization is more sever than others. However, this has to be correlated with the clinical context.

Table 1: Gender distribution of cases with positive CAS

	Male	Female	Total cases
Cases with positive CAS	50	60	110
%	46	54	100

Table 2: Age distribution of cases with positive CAS

	Number of cases	% per total cases
Birth – 10 years	6	5
10 – 20 years	10	9
20 – 30 years	23	21
30 – 40 years	37	34
40 – 50 years	16	15
50 – 60 years	9	8
>60 years	9	8
	110	100%

Table 3: Which ADS are commonly associated with CAS?

	Number of case	% per total cases	Which ADS are more commonly associated with CAS?
Allergic rhinitis, sinusitis	59	53	1-Commonest
Atopic dermatitis	25	23	2-Lesser common
Asthma	20	18	
Urticaria, angioedema	15	14	
Food allergy	9	8	3-Least common
Allergic conjunctivitis	6	5	
Contact dermatitis	5	4	

Results

Gender distribution of cases with positive CAS is in favour of females: 60 (54%) while males are 50 (46%) (Table 1).

Adult and middle ages are the commonest to have CAS (55% of cases): 37 (34%) in age period between 30-40 years, 23 (21%) in age period between 20-30 years. This is followed by age period between 40 and 50 years as 16 (15%).

Others age periods are less frequent (Table 2).

Commonest ADs associated with CAS are allergic rhinitis and sinusitis as 59 (53%). Lesser common group of ADs associated with CAS are: atopic dermatitis 25 (23%), asthma 20 (18%), urticaria and angioedema 15 (14%). Least common group of ADs associated with CAS are: food allergy 9 (8%), allergic conjunctivitis 6 (5%), contact dermatitis 5

(4%) (Table 3).

Commonest inhalant sensitization associated with CAS is house dust mite: DF 53 (48%), DP 52 (47%). Lesser common group of inhalants associated with CAS are: dog 42 (38%), hoarse 40 (36%), cockroach, aspergillus fumigatus 39 (35%), alternaria 38 (34%), cladosporium 35 (32%). Least common group of inhalants associated with CAS

Table 4: Which inhalant allergens are more commonly associated with CAS?

	number of positive sensitization results	% per total cases	Which inhalants are more commonly associated with CAS?
Dermatophagoides farina (DF)	53	48	1-Commonest
Dermatophagoides pteronyssinus (DP)	52	47	
Dog	42	38	2-Lesser common
Hoarse	40	36	
Cockroach	39	35	
Aspergillus fumigatus	39	35	
Alternaria	38	34	
Cladosporium	35	32	
Sheep	32	29	3-Least common
Penicillium	27	24	
Latex	26	23	
Camel	9	8	Rare

are: sheep 32 (29%), penicillium 27 (24%) and latex 26 (23%). Camel sensitization is rare (Table 4).

Highest sever inhalant allergen sensitization is to camel as 4.3. Lesser severity group of inhalant allergens are: DP 2.2, cat and DF 2.1, cockroach 2. Least sever group of inhal-

Table 5: Which inhalant allergen sensitization is more sever?

	Number of positive sensitization results	Total score of severity	Average severity level	Which inhalant allergen sensitization is more sever?
Camel	9	39.3	4.3	1-highest severity
Dermatophagoides pteronyssinus (DP)	52	115	2.2	2-Lesser severity
Cat	110	233.6	2.1	
Dermatophagoides farina (DF)	53	114.2	2.1	
Cockroach	39	79.7	2	
Cladosporium	35	59.2	1.7	3-least severity
Alternaria	38	58.1	1.5	
Dog	42	53.2	1.3	

Hoarse	40	52.6	1.3
Sheep	32	41.7	1.3
Aspergillus fumigatus	39	50.4	1.3
Latex	26	34.4	1.3
Penicillium	27	29.9	1.1

ant allergens are: cladosporium 1.7, alternaria 1.5, dog 1.3, hoarse 1.3, sheep 1.3, aspergillus fumigatus 1.3, latex 1.3, penicillium 1.1 (Table 5).

Discussion

In Saudi, CAS is more common in adult and middle ages (Table 2). These age groups are moving all over the place and are continuously exposed to cats either indoors or outdoors. Additionally, these age periods are more susceptible to CAS and their sIgEs to cats may increase quickly. In a study done in Italy, it was shown that indoor cats can increase the risk of CAS in adults while it is not the same for kids. This means that we should advice adults to avoid getting indoor cats. This advice is more important for adults with previous history of allergies.⁵

Allergic rhinitis and sinusitis are the commonest ADs associated with CAS in Jeddah – Saudi. Nasal mucosa is the first line of defense when patients inhale cat dander. Moreover, cat allergens are extensively distributed in all places because it moves around everywhere. This finding is well-matched with the world evidence. In (Sharгородsky J et al) study, it was revealed that indoor cats exposure do increase rhinitis prevalence in adults (p 0.01). However, this finding isn't the same in children. We need more studies to clarify why adults are more prone to CAS than children? (Table 3). Lesser common groups of ADs associated with CAS are: atopic dermatitis, asthma, urticaria and angioedema.⁶

When do you think asthma of my child will be relieved? This is a frequent question asked by parents. It can be asked by asthmatic adults also. This is a question about asthma prognosis in cat owners. In (M. Perzanowski) study it was shown that asthma prognosis is related to the sensitization level to cats. Sensitization level to cats can be revealed by the level of sIgE titer against it. It was shown that as the titer of sIgE to cat increases the severity of asthma will increase and vice versa. This titer can be discovered by either in vivo SPT or in vitro RAST blood test.^{7,8}

Indirect cat exposure means the inhalation of cat allergens without close contact. This may happen due to the presence of hidden source of cat allergens because cats move everywhere in public places and their danders are widespread. This type of exposure is significant in adults more than children. Several studies prove that many adult pa-

tients who are sensitized to cats don't have it indoors. In a study done in USA in 2013, it was revealed that mothers who are sensitized to cats or have symptoms after cat exposure don't have it in their homes.⁹

Detailed clinical history is the main key for cat allergy diagnosis. Positive history means the immediate appearance of allergic symptoms after cat exposure. Symptoms of cat allergy can appear on respiratory system or skin...etc. Additional way of diagnosis is measuring the level of sIgE immunoglobulins against cats. This can be done either by in vivo SPT or in vitro RAST blood test. Moreover, there is a recent emerging way which can detect a small parts of cat epitope. This is a recombinant expensive way when compared to previous tests. Because this technique is sophisticated it can be done in certain situations only.¹⁰

Giving cat avoidance advice is a conflicting issue. Do we need to give cat avoidance advice or not? Is it possible to do complete cat avoidance or not? Theoretically complete cat avoidance is easy but practically it's a difficult issue! Emotional bond with cats is huge and is considered as the main reason. Additionally, indirect cat exposure makes the complete avoidance almostly impossible. Moreover, cat avoidance in already sensitized ones is useless. A logic evidence base protocol is to advice adults to avoid direct exposure to cats not children.¹¹

Sublingual immunotherapy is a recent treatment for cat allergy which is composed of drops that can be taken under tongue. As it must be taken for several years, its course is divided into loading and maintenance. Loading course is daily drops for several months. Maintenance course is less frequent doses for several years. Compliance issue is the main patient's error because many of them stop use when their symptoms improve. Several studies found that AIT succeeds to ameliorate allergy symptoms after one year. Good follow up tools which can give a good idea about patients response are: the improvement in their symptoms, decreased level of sIgE to cats, increased level of sIgG to cats.^{12,13}

Conclusion

CAS in Saudi has the following characters: 1-Adult and middle ages are the commonest to have CAS. 2-Nasal allergies are the commonest ADs associated with CAS (allergic rhinitis and sinusitis), followed by atopic dermatitis,

asthma, urticaria and angioedema. 3-Indoor allergens are the commonest inhalant allergens associated with CAS: house dust mite, followed by dog, cockroach and mold (aspergillus, alternaria and cladosporium). 4-Camel sensitization is the most severe sensitization followed by indoor allergens (mites, cat, cockroach). However, severity class has to be correlated with clinical context.

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