

PETS OWNERSHIP: ITS EFFECT ON ALLERGY AND RESPIRATORY SYMPTOMS

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SUMMARY:

■ **Background:** Studies have shown that pets are very important sensitizing agents in patients with asthma. Respiratory disorders such as asthma and allergic rhinitis are common in the State of Qatar.

■ **Objective:** The aim of the present study was to determine whether exposure to pets and domestic animals plays a significant role in the development of asthma and allergic rhinitis among Qatari population

■ **Design:** A hospital-based prospective descriptive study conducted.

■ **Setting:** Allergy Laboratory at the Hamad General Hospital and Hamad Medical Corporation, State of Qatar.

■ **Patients:** Adult patients over 12 years of age diagnosed with bronchial asthma and/or allergic rhinitis who were referred for allergy skin prick test. 1106 adult patients recruited with respiratory diseases of suspected allergic origin who attended Allergy Clinic at the Hamad General Hospital, during three years from January 2001 to April 2003. Total of 1106 whom 607 were females (54.9 %) and 499 were males (45.1%) and their mean was age 30 years (12-48).

■ **Methods:** Skin Prick Test (SPT) was performed on 1106 patients for common allergens whom the blood sample was taken for measuring total IgE concentration.

■ **Results:** There were 1106 patients studied and 496 patients (44.9%) had positive and 610 (55.1%) had negative skin prick tests. Out of 1106 patients, 311 patients (28.1%) had asthma; 503 patients had allergic rhinitis (45.5%) and 87 patients (7.8%) had skin allergy. Three hundred and forty (340/1106=30.7%) of the 1106 subjects studied had at least one animal at home, and the remaining 69.3% had never had pets in the home. A further 12% reported having had pets in the past, but not anymore. Cats (26.7%), goats (15%) and birds (14.7%), animals were the most common present within the house and was the most frequently seen pet types when compared to other pet types. The risk of having asthma (RR: 1.29; 95% CI: 1.07-1.55; p=0.008), allergic rhinitis (RR: 1.48; 95% CI: 1.24-1.77; p<0.0001) and eczema (RR: 3.56; 95% CI: 1.24-1.77; p<0.0001) was significantly higher in subjects with animals than in patients without.

■ **Conclusion:** In the present study, the prevalence of asthma, rhinitis, and skin allergy was significantly more common in families with animals than in those without.

INTRODUCTION

Asthma is a multifactorial disease related to both familial (1-4) and environmental factors (5-6). The prevalence of asthma seems to have increased in developing and industrialized countries (7-8) the cause of these increases is still unknown and not documented. However, it is now generally accepted that asthma has a hereditary basis (1-4) but environmental factors (9, 10) have been shown to be equally important and can also be blamed (9). One environmental factor that has been shown to contribute to the

aetiology of asthma is ownership of pets (11-18), which are known to produce allergens either causing or aggravating asthma. The relationship between pet ownership and respiratory allergy was investigated in a population of Dutch and it was found that the highest prevalence of reported pet allergy, chronic cough, wheeze, attacks of shortness of breath with wheezing, and doctor-diagnosed asthma was found in children who had pets in the past but not anymore (16).

Several pets like, cats, dogs, rabbit, bird, goat or sheep, poultry, camels and fish are known to produce allergens which may cause or aggravate respiratory allergy. Varying degrees of sensitization to allergens produced by these pets have been found in clinical studies among patients with asthma or allergy (11-18) was as high as 65% in one study (19). Also some population studies have also addressed the issue of pet allergy among over 40,000 Swedish children, it was reported

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that 5.3% had animal dander allergy and prevalence of reported animal dander allergy in asthmatic children was 57% (20). Recently reported by the EGEA Study (18) that the exposure to pet in early life, and in particular before asthma onset, may protect against allergen sensitization in adulthood. In fact, the effects of pet-keeping in childhood vary according to the type of pet, the allergic sensitization of the individual and wider environmental exposure to allergen (17). Whether pet-keeping early in life protects against or promotes allergy remains unclear.

In the Gulf countries, generally Arab Gulf nationals do not tend to keep pets like dog and cats, but may have animals such as cat, dog, birds, goat, horse, birds, rabbit, and sheep. The aim of the present study was to determine whether exposure to domestic animals plays a significant role in the development of asthma and to estimate the risk of exposure to pets among Qatari population.

PATIENTS AND METHODS

Patients

This is a hospital-based prospective study based on 1106 patients with respiratory, and with skin allergic diseases who attended asthma and allergy clinics at the Hamad General Hospital, over a period two years from January 2001 to April 2003. A comprehensive information on patients included were: patients' age, sex, disease history, respiratory allergy, allergic rhinitis, duration of symptoms, history of asthma, and skin allergy diseases.

Skin testing

All patients stopped anti histamines for 5 day prior to skin testing. Active urticaria or eczema were contraindications to skin test. Allergy skin tests were carried out according to the prick technique (20). The procedure for Skin prick testing (SPT). was standard, using "stallerpoint", on the volar surfaces of the forearms. Histamine chloryhydrate 1% was used as positive control, and glycerol-phenol normal saline as negative control. Allergy skin test material consists of standardized simple aqueous extract (Stallergen, France). The test starts with a drop of each extract placed on the volar surface of the forearm, then a standard (stallergen, France) Lancetters is used to puncture the skin through the drop forcing a small amount of the extract into the skin. Test is measured in millimeters, and is considered positive if a wheal and flare reaction at

least 3 mm more than the negative control develops at the skin sites within 15 minutes after testing, and considered highly positive if the wheal diameter is more than a positive control. A wheal of at least 5mm in diameter with a negative phenol-saline control was considered a positive response. A negative test with a positive control is considered negative.

Choice of allergens

Pollinic allergens were selected in accordance with a survey of the native and imported flora in the Qatar and from preliminary data obtained by one of us (HAS). Other classical inhalant allergens, e.g. animals, insects were added to pollinic extracts. Allergenic extracts were obtained from various manufacturers (Stallergenes Institut Merieux, Bencard, Hollister-Stier). Some of these companies have since merged with other groups and are not known under those names anymore. All patients were tested with a battery of 175 allergens. Some other allergens were used from time to time.

In the present study, cat, dog, birds, goat, horse, birds, rabbit, and sheep were aggregated as "pets" and "domestic animals". In a separate analysis symptoms prevalence were calculated for patient who had one type of pet only. This calculation was done to investigate the differences in symptom prevalence associated with present or past ownership of these pets.

Statistical analysis

The Statistical Package for Social Science computer program (21) (SPSS) was used for statistical analysis. Chi-square analysis was performed to test for differences in proportions of categorical variables between two or more groups. In 2x2 tables, the Fisher exact test (two-tailed) was used instead of Chi-Square, in particular, when sample size was small. Mantel-Haenszel test was used to ascertain the association between two categorical variables and calculate relative risk (RR) and their confidence intervals (CI). The level $p < 0.05$ was considered as the cut-off value for significance.

RESULTS

Table 1 shows the distribution of skin prick test results amongst the 1106 patients studied, of whom 496 patients (44.9%) had positive and 610 (55.1%) had negative skin prick tests. 607 were females (54.9 %) and 499 were males (45.1%). Their mean age was 30 years (12-48). The subjects were from different nationalities, 698 were Qatari's (63.1%) and 408 were non-

Qatari's (36.9%). Out of 1006, 311 patients (28.1%) had asthma and 503 patients had allergic rhinitis, (45.5%) and 87 patients (7.8%) had skin allergy.

Table 2 shows prevalence of asthmas, allergic rhinitis, and eczema associated with pet ownership. Three hundred and forty (340/1106=30.7%) of the 1006 subjects studied had at least one animal at home, and the remaining 69.3% had never had pets in the home. A further 12% reported having had pets in the past, but not anymore.

Table 3 presents sensitivity to pets by gender. The analysis in this paper focused on cats, dogs, birds, goat, horse, rabbit, and sheep. The risk of having asthma (RR: 1.29; 95% CI: 1.07-1.55; $p=0.008$), allergic rhinitis (RR: 1.48; 95% CI: 1.24-1.77; $p<0.0001$) and eczema (RR: 3.56; 95% CI: 1.24-1.77; $p<0.0001$) was significantly higher in subjects with animals than in patients without.

Of all respondents 340 patients reported that they have respiratory symptoms, pet allergy, doctor-diagnosed asthma, rhinitis and eczema from 1106 families studied. Many homes were found to contain more than

one category of pets 23.0% (78/340), but there was also a number which had had one category of pet only.

Table 4 shows the prevalence of reported pet allergy, doctor-diagnosed asthma, rhinitis and eczema in the 340 patients who kept animals at home. 45 patients (13.2%) were reported pet allergy, 114 (33.5%) asthmatic, 188 (55.3%) rhinitis, and 47 (13.8%) eczema. Cats (26.7%), goats (15%) and birds (14.7%), animals were the most common present within the house and was the most frequently seen pet types when compared to other pet types.

DISCUSSION

This study shows that current pet ownership was associated with respiratory symptoms such as asthma, chronic cough, chronic wheeze, rhinitis, and eczema, as was found in some previous studies (10, 18). Convincing arguments are also made for the importance of genetic factors in the aetiology of asthma (1-6). It seems likely both these factors complement each

Variables	Positive SPT* n = 496		Negative SPT n = 610		p-value significance
	Frequency	%	Frequency	%	
Age (in years)					
<15	41	8.3	38	6.2	0.003
15-24	110	22.2	86	14.1	
25-34	111	22.4	147	24.1	
35-44	122	24.6	179	29.3	
>45	112	22.6	160	26.2	
Gender					
Males	242	48.8	257	42.1	0.029
Females	254	51.2	353	57.9	
Nationality					
Qatari	327	65.9	371	60.8	0.046
Non Qatari	169	34.1	239	39.2	
IgE Levels					
<100 Ku/l	194	39.1	144	23.6	NS
>100 Ku/l	302	60.9	466	76.4	
Asthma					
Yes	155	31.3	156	25.6	0.037
No	341	68.8	454	74.4	
Allergic rhinitis					
Yes	414	83.5	89	85.4	NS
No	82	16.5	521	14.6	
Skin allergy					
Yes	47	9.5	40	6.6	NS
No	449	90.5	570	93.4	

Table 1: Characteristics of the population by Skin Prick test results (N = 1106).

SPT = Skin Prick Test.

NS = Not-significant.

Symptoms	Family with pet (N=340) n(%)	Family without pet (N= 766) n(%)	Relative risk (95% CI)	p-value significance
Asthma	114 (33.5)	197 (25.7)	1.29(1.07-1.55)	0.008
Allergic rhinitis	188 (55.2)	315 (41.1)	1.48 (1.24-1.77)	0.0001
Eczema	47 (13.8)	33 (8.3)	3.56 (2.185-82)	0.0001

Table 2: Clinical diagnosis of asthma, allergic rhinitis, cough, and eczema associated with pet ownership.
CI = Confidence interval.

Pets and domestic animals	Males Positive skin test		Females Positive skin test		p-value significance
	n	%	n	%	
Cat	46	25.7	45	27.9	NS
Dog	4	2.2	9	6.0	NS
Birds	34	19.0	16	9.9	p<0.05
Goat	28	15.7	23	14.2	NS
Horse	18	10.0	16	9.9	NS
Rabbit	5	2.8	14	8.7	NS
Sheep	2	1.1	2	1.2	NS
Combination	42	23.5	36	22.2	NS
TOTAL	179	100	161	100	

Table 3. Sensitivity to pets by gender.
NS = Not-significant.

Pets and domestic animals (Number)	Asthmatic (n=114)		Non Asthmatic (n=226)		Rhinitis (n=188)		No Rhinitis (n=152)		Skin allergy (n=47)		No skin allergy (n=293)	
	n	%	n	%	n	%	n	%	n	%	n	%
Cats (91)	37	11.0	54	6.8	54	5.8	37	21.6	5	6.3	86	8.4
Dogs (13)	6	1.9	7	1	9	1.0	4	2.3	1	1.3	12	1.2
Rabbit (19)	6	1.9	13	1.6	17	1.8	2	1.2	1	.3	18	1.9
Birds (50)	8	11.2*	42	4.8	24	5.0	26	3.5	18	22.5*	32	3.1
Horse (34)	13	4.2	21	2.6	28	3.0	6	3.5	4	5.0	30	2.9
Goats (51)	24	7.7	27	3.4	23	4.6	28	4.7	3	3.8	48	4.7
Sheep (4)	1	0.3	3	1.0	2	0.2	2	1.2	1	1.3	3	0.3
Combination (78)	19	18.9*	59	6.1	31*	3.3	47	27.4	14	17.5*	64	6.2

Table 4: Percentage of subjects with asthma, Allergic rhinitis, skin allergy conditions in families with different pets and animals at home.
* p< 0.05.

other in the development of asthma. In the prevention and management of asthma, the external allergenic factor should be considered and appropriate advice given to families with pets

Slightly one-third of the families (33.7%) had pet allergy and respiratory symptoms. Our data strongly sup-

ports previous studies in showing that the presence of animals in homes is much more common in children who have respiratory and skin symptoms (10-18). The most common offending animals were the bird, the cat, and the goat. Birds are favored pets in this part of the world and dogs and rabbits, are reared. In studies where past ownership of pets was

considered, it was found that symptoms attributable to nose, chest or skin were common in the families who reported past ownership of cats and other animals. In other studies, cats were found to be most commonly related to allergies (11-18).

The prevalence rates of pet allergy, asthma, rhinitis and eczema in families with different types of animals in the present study is much higher than one would expect for the population group. The number of cat, birds and dogs were too few to warrant any comment, but the trend was of a high prevalence rate of allergic rhinitis and eczema in children of families with birds, and cats. A study looking at risk of immunologic sensitization to domestic animals in subjects with asthma found that cumulative duration of exposure to domestic animals was a significant determinant for immediate desensitization to animal-derived antigens (10-12). This sensitization could also occur in schools due to the allergens from furred pets brought to school on the children's uniforms and in a study from Sweden (13) the major cat and dog allergens were found to be high enough to sensitize children and to induce asthma in those who were allergic to cats and dogs. Sensitization is produced in varying grades to allergens produced by pets (10). Some studies suggest that early exposure to cat allergens predispose to later development of asthma (10-19). It is now clear that the risk of sensitization to allergens derived from cats, cockroaches or grass pollens is restricted to patients exposed to high levels of these allergens. A study from New Zealand demonstrated sensitivity to house dust mites (30.1%) and cat dander (13.3%) were highly significant independent risk factors associated with the development of asthma (11, 19).

It is increasingly evident that a thorough assessment is necessary and this includes inquiry about ownership of pets and other domestic animals. In a study of 40,000 children in Sweden, it was reported that 5.3% had animal dander allergy and prevalence of reported animal dander allergy in asthmatic children was 57% (22). Other studies showed positive skin test to cat dander among 13.3% of the investigated children (11) and to animal dander among 65% of children studied (23). In the present study, the prevalence of asthma, rhinitis, and skin allergy was significantly more common in families with animals than in those without.

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