Allergologia et immunopathologia
Sociedad Española de Inmunología Clínica, Alergología y Asma Pediátrica
www.all-imm.com

ORIGINAL ARTICLE

OPEN ACCESS

Beyond sensitization: real-life thresholds for cat allergy in children

Güler Yıldırım[a]*, Nilay Çalışkan[a], Merve Karaca Şahin[a], Hamit Boloğur[a], Muhammed Fatih Erbay[a], Hilal Güngör[a], Şefika İlknur Kökçü Karadağ[a], Aslı Berivan Topçak[a], Hasan Tunç Şarman[a], Özlem Terzi[b], Deniz Özçeker[a]

[a]*Department of Pediatric Allergy and Immunology, Prof. Dr. Cemil Taşcıoğlu City Hospital, Sağlık Bilimleri University, Istanbul, Turkey*
[b]*Department of Public Health, 19 Mayıs University, Samsun, Turkey*

Received 2 November 2025; Accepted 5 February 2026
Available online 1 July 2026

KEYWORDS
cat allergy;
cat-specific IgE;
children;
diagnostic cut-off;
skin prick test

Abstract
Background: Cat sensitization is common in patients with allergic diseases and may not always produce clinical symptoms.
Objective: This study aimed to assess the correlation between skin prick test (SPT), cat-specific immunoglobulin E (cat sIgE), and symptoms in sensitized children, and to determine optimal thresholds and predictors for clinical cat allergy.
Methods: We retrospectively evaluated 1052 cat-sensitized children (2017–2024) who underwent SPT and/or cat sIgE testing. Patients were grouped by presence of cat-related symptoms, and their clinical, laboratory, co-sensitization, and exposure characteristics were compared.
Results: Clinical symptoms developed after exposure in 39% of cat-sensitized patients. The optimal cat sIgE cut-off was 1.05 kU/L (sensitivity 71.4% and specificity 93.0%), and 4.5 mm for SPT (sensitivity 64.1% and specificity 75.9%). Multivariate analysis identified cat sIgE positivity as the only independent risk factor for symptom development (odds ratio [OR]: 23.22, 95% confidence interval [95% CI]: 11.62–46.39). Environmental exposure characteristics were significant in univariate analysis; in particular, contact at home (OR: 2.35; 95% CI: 1.48–3.71; P < 0.001), family visitation/indoor contact (OR: 2.99; 95% CI: 1.88–4.74; P < 0.001), and sharing a household with a cat (OR: 3.74; 95% CI: 1.78–7.85; P < 0.001) were associated with symptom development. Positivity for the house dust mites *Dermatophagoides farinae* (OR: 1.59; P < 0.001) and *Dermatophagoides pteronyssinus* (OR: 1.65; P < 0.001) and grass pollen sensitization (OR: 1.69; P < 0.001) were also significantly associated with symptomatic patients.
Conclusions: Cat sIgE positivity independently predicts symptoms, with 1.05 kU/L for sIgE and 4.5 mm for SPT identified as reliable diagnostic cut-offs.

***Corresponding author:** Güler Yıldırım, MD., Çanakkale Mehmet Akif Ersoy State Hospital, Department of Pediatric Allergy and Immunology, Çanakkale, Turkey. *Email address*: guleryildirim@gmail.com

https://doi.org/10.15586/aei.v54i4.1617

Introduction

Cat allergy is a common respiratory allergy worldwide and its symptoms vary on a wide spectrum from mild rhinitis to asthma and anaphylaxis.[1]

In recent years, cat sensitization has become increasingly common; it has been reported in 12.1% of the population aged >6 years in the United States, and in 9.6% of boys and 6.6% of girls in Germany.[2]

Skin prick test (SPT) and cat-specific immunoglobulin E (cat sIgE) tests are commonly used in the diagnosis of cat allergy. However, there are still uncertainties in the literature regarding the optimal cut-off values that ensure compliance of these tests with clinical symptoms.[3,4]

While negative SPT and cat sIgE results have a strong negative predictive value to exclude allergy, positive results may not always confirm clinical allergy.[5] Patients with sensitization to cat allergens may not always produce clinical symptoms.[6] Furthermore, cat-sensitized patients may tend to remove or abandon their cats because of the possibility of developing symptoms.[7]

Therefore, determining accurate cut-off values improves diagnostic accuracy in children and prevents unnecessary diagnoses.[8]

The aim of this study is to evaluate the concordance of SPT and cat sIgE results with clinical symptoms in children tested for cat allergy, to determine optimal cut-off values for these tests, and to investigate co-sensitizations to other allergens accompanying cat allergy.

Materials and Methods

Patients aged between 6 months and 18 years who presented to the Pediatric Allergy Outpatient Clinics of our hospitals between 2017 and 2024 were evaluated retrospectively. The study included patients who underwent an SPT and/or cat sIgE testing and were found to be positive in at least one of these tests.

Patient evaluation

Patients were classified into two groups: those who developed symptoms following cat exposure and those who did not develop such symptoms. Patients with no history of cat exposure, those who could not recall their symptoms, or had incomplete data were excluded from the study. Patients with a history of acute asthma exacerbation, severe skin disorders, autoimmune diseases, or immunodeficiency were also excluded from investigation.

Cat sensitization is defined as a positive result of cat SPT and/or cat sIgE. Cat allergy is defined as sensitization demonstrated by a positive cat SPT and/or cat sIgE, along with the presence of one or more allergic symptoms following cat exposure.

Clinical and laboratory data

To collect demographic and laboratory data, patient records were reviewed initially, and any missing information was completed through interviews with the parents. Allergic symptoms were assessed based on reactions occurring after cat exposure, including ocular symptoms (tearing, redness, and itching), nasal symptoms (sneezing, nasal itching, rhinorrhea, and nasal congestion), skin symptoms (atopic dermatitis, urticaria, angioedema, and itching), respiratory symptoms (coughing and shortness of breath), and systemic reactions, such as anaphylaxis.

The presence of asthma, atopic dermatitis, and allergic rhinitis in patients was evaluated by an allergy specialist. The diagnosis of asthma was based on the guidelines of the Global Initiative for Asthma (GINA), atopic dermatitis based on the revised Hanifin and Rajka criteria, and allergic rhinitis according to the guidelines of the Allergic Rhinitis and its Impact on Asthma (ARIA).[9-11]

Skin prick test

Antihistamines were discontinued 7 days, oral corticosteroids 1 month, and topical corticosteroids 14 days prior to testing. SPT was performed using a standard panel of the following 11 allergen extracts: *Dermatophagoides farinae (Df), Dermatophagoides pteronyssinus (Dp), Alternaria alternata, Felis domesticus, Canis familiaris,* grass pollen mix, weed pollen, cereal grain pollen, tree pollen mix, latex, and cockroach (commercial dander extract; ALK, Spain). Allergen extracts were applied on the volar surface of the forearm using a drop on a lancet tip inserted approximately 1 mm deep into the skin.

Histamine (0.1%) was used as a positive control and physiological saline as a negative control. According to the guidelines of the European Academy of Allergy and Clinical Immunology (EAACI), the test was evaluated after 15 min, and a wheal diameter of ≥3 mm was considered positive.[12]

Specific IgE measurement

Serum samples were analyzed using the IMMULITE® 1000 chemiluminescent immunoassay system (Siemens Healthcare Diagnostics, Germany), following the manufacturer's instructions. The assay has a detection range of 0–100 kU/L for IgE. Values >0.35 kU/L were considered positive.The cat sIgE tests categorized as "unknown" matched to patients in whom cat sIgE testing was not performed.

Ethical approval

Ethical approval for this study was obtained from the Ethics Committee of our hospital, dated November 04, 2024 (Approval No.: 253).

Statistical analysis

Data were coded and analyzed using the SPSS software (Version 22; SPSS Inc., Chicago, IL, USA). The normality of distribution for continuous variables was assessed using the Kolmogorov–Smirnov test. Non-normally distributed continuous variables were expressed as median

(minimum–maximum), while categorical variables were presented as numbers and percentages (%). The Mann–Whitney U test was used for continuous variables, and the Pearson Chi-squared test was used for categorical variables. Risk factors were evaluated using univariate and multivariate binary logistic regression analysis. Receiver operating characteristic (ROC) analysis was performed to determine the probability of developing symptoms upon cat exposure; $P < 0.05$ was considered statistically significant.

Results

Demographic characteristics and clinical diagnoses

A total of 1202 patients were initially included in the study. However, 150 patients who had no prior contact with cats were excluded. Accordingly, the analyses were performed on 1052 patients. Among the cat-sensitized patients, 39% (n = 410) were symptomatic upon cat exposure, while 61% (n = 642) showed no symptoms.

The median age of asymptomatic children was 84 months (range: 12–228 months), whereas the median age of symptomatic children (n = 410) was 108 months (range: 6–240 months), and the median age was significantly higher in the symptomatic group ($P < 0.001$).

The most common primary diagnosis among the patients was allergic rhinitis, with similar frequencies in both groups (57.7% and 56.6%, respectively; $P = 0.740$).

SPT, Cat sIgE findings, and laboratory results

Skin prick test was performed in 1049 patients, while cat sIgE test was performed in 483 patients.

Cat SPT positivity (a wheal diameter of ≥3 mm) was high in both groups; however, it was more frequently observed in the asymptomatic group (99.7%) compared to the symptomatic group (92.4%; $P < 0.001$) (Table 1). The positivity proportion for cat sIgE was 41.7% in symptomatic children and 3.4% in asymptomatic children, with a statistically significant difference between both groups ($P < 0.001$) (Table 1).

In children who experienced symptoms after cat exposure, the positivity proportion for *Dermatophagoides farinae*, *Dermatophagoides pteronyssinus*, and grass pollen mix were significantly higher (for all three, $P < 0.001$), whereas mold sensitivity was more common in the asymptomatic group (39.1% vs. 27.3%; $P < 0.001$).

The median level of cat sIgE was 9.0 kU/L (range: 0.1–100 kU/L) in the symptomatic group, whereas it was 0.1 kU/L (range: 0.1–66.7 kU/L) in the asymptomatic group ($P < 0.001$) (Table 1).

Table 1 Comparison of demographic and allergic characteristics according to symptom development after cat exposure.

Variables		No symptoms with cat exposure (n: 642)	Symptoms present with cat exposure (n: 410)	P
Age (months) Median (minimum-maximum)		84 (12-228)	108 (6-240)	**<0.001**
Gender	Female	300 (46.7)	196 (47.8)	0.733
	Male	342 (53.3)	214 (52.2)	
Primary diagnosis	Allergic rhinitis	369 (57.7)	231 (56.6)	0.740
	Asthma	210 (32.8)	151 (37.0)	0.163
	Urticaria	64 (10.0)	30 (7.4)	0.144
	Food allergy	6 (0.9)	4 (1.0)	0.944
	Anaphylaxis	4 (0.6)	9 (2.2)	**0.024**
	Atopic dermatitis	58 (9.1)	24 (5.9)	0.062
Skin prick test for cat allergen	Negative (<3 mm)	2 (0.3)	31 (7.6)	**<0.001**
	Positive (≥3 mm)	640 (99.7)	376 (92.4)	
Cat-specific IgE	Negative	231 (36.0)	59 (14.4)	**<0.001**
	Positive	22 (3.4)	171 (41.7)	
	Unknown	389 (60.6)	180 (43.9)	
Dermatophagoides farinae positivity		351 (55.0)	260 (66.2)	**<0.001**
Dermatophagoides pteronyssinus positivity		252 (39.5)	204 (51.9)	**<0.001**
Skin prick test positivity	Grass mix	178 (28.1)	155 (39.6)	**<0.001**
	Dog	118 (18.7)	64 (16.5)	0.372
	Mold	242 (39.1)	105 (27.3)	**<0.001**
	Weed	125 (20.1)	86 (22.8)	0.325
	Cereal pollen	23 (3.7)	17 (4.5)	0.530
	Tree mix	181 (29.0)	111 (29.1)	0.413
	Latex	10 (1.6)	9 (2.4)	0.382
	Cockroach	25 (4.1)	20 (5.4)	0.330
Cat-specific IgE (kU/L)Median (minimum-maximum)		0.1 (0.1-66.7)	9,0 (0.1-100)	**<0.001**
Total IgE (IU/mL)Median (minimum-maximum)		132.5 (0.2-1990)	266 (0.8-1985)	**<0.001**
Eosinophil count ($\times 10^9$/L)Median (minimum-maximum)		270 (0.8-1380)	360 (1.1-1490)	**<0.001**
Eosinophil percentage (%)Median (minimum-maximum)		3.2 (0.1-78)	4.7 (0.1-170)	**<0.001**

The median wheal diameter in the cat SPT was 6 mm (range: 0–34 mm) in the symptomatic group and 3 mm (range: 0–12 mm) in the asymptomatic group, showing a statistically significant difference (P < 0.001). The median wheal diameters for both *Dermatophagoides farinae* and *Dermatophagoides pteronyssinus* were 7 mm (range: 3–29 mm for *Df* and 1–30 mm for *Dp*) in the symptomatic group, compared to 5 mm (range: 1–25 mm for *Df* and 1–30 mm for *Dp*) in the asymptomatic group, with both differences being statistically significant (P < 0.001).

For dog allergen, grass pollen, weed pollen, cereal grain, and tree pollen panels, the median values were also higher in the symptomatic group, with observed statistically significant differences (P = 0.011, P < 0.001, P = 0.001, P = 0.002, and P = 0.007 for respective panel).

Exposure characteristics and symptom profile

In the group that experienced symptoms after cat exposure, indoor exposure (11.2%) and exposure during family visits (12.7%) were more common, compared to the asymptomatic group (5.6% and 5.0%, respectively). In contrast, outdoor exposure was more frequent in the asymptomatic group (89.4%), and the differences were statistically significant (P < 0.001). Regarding the type of exposure, living in the same household with a cat was more common in the symptomatic group (10.7% vs. 4.0%; P < 0.001) (Table 2).

Among patients who experienced symptoms after cat exposure, the most frequently reported symptoms were tearing/redness (40.2%), nasal congestion/rhinorrhea/sneezing (36.3%), and cough (36.3%) (Table 3).

Association with cat breed

In the study, cat breeds were categorized into two groups: tabby cats and other breeds. The “other breeds” group included British Shorthair, Scottish Fold, Turkish Angora, Persian, Orange Tabby, Black Smoke, Norwegian Forest Cat, Norwegian Forest Cat × British Shorthair, Tabby × Scottish Fold, Siamese, Turkish Van × Tabby, and Tabby × Turkish Angora. Contact with tabby cats was observed in 95.3% of the cases, while contact with other breeds occurred in 4.7% only. Among children exposed to tabby cats, 37.6% (n = 377) exhibited symptoms, whereas 67.3% (n = 33) of those exposed to other breeds showed symptoms. This difference was found to be statistically significant (P < 0.001).

Regression analysis results

Factors associated with symptom development were evaluated using logistic regression. The analysis revealed that cat sIgE positivity was 23.22 times higher in the symptomatic group compared to the asymptomatic group, and this was identified as the only independent predictor of symptom development (P < 0.001; 95% confidence interval [95% CI]: 11.62–46.39) (Table 4).

When an SPT wheal size of 4.5 mm was accepted as the optimal cut-off value for cat sensitization, the sensitivity was 64.1% and the specificity was 75.9% (area under the curve [AUC]: 0.720, standard error [SE]: 0.018; P < 0.001; and 95% CI: 0.685–0.754). For cat sIgE, the best discriminatory value was discovered as 1.05 kU/L, with a sensitivity of 71.4% and a specificity of 93.0% (AUC: 0.849; SE: 0.018; P < 0.001; and 95% CI: 0.813–0.885) (Table 5).

The diagnostic performance of both parameters is summarized by an ROC analysis (Figure 1).

Risk factors affecting the presence of systemic symptoms (e.g., anaphylaxis and dyspnea) were evaluated using univariate analyses. It was determined that each unit increase in *Dp* (mm), cat sensitivity (mm), and grass panel (mm) values increased the risk of systemic symptoms by 1.09–1.15 times (P < 0.05 in all comparisons). The risk of systemic symptoms was 5.7 times higher in those with cat sIgE positivity (P = 0.008; 95% CI: 1.57–20.69), while the risk was 2.77 times higher in those with asthma diagnosis (P = 0.041; 95% CI: 1.05–7.33). In addition, a diagnosis of rhinitis was discovered as a factor reducing the risk of systemic symptoms (odds ratio [OR]: 0.31; P = 0.027; and 95% CI: 0.11–0.87). In the multifactorial logistic

Table 2 Comparison of cat exposure characteristics in relation to symptom development.

Variables		No symptoms with cat exposure (n: 642)	Symptoms present with cat exposure (n: 410)	P
Place of cat exposure	Outdoors	574 (89.4)[a]	312 (76.1)[b]	**<0.001**
	At home	36 (5.6)[a]	46 (11.2)[b]	
	During a family visit/in an indoor setting	32 (5.0)[a]	52 (12.7)[b]	
Type of cat contact	Shared household with a cat	26 (4.0)[a]	44 (10.7)[b]	**<0.001**
	Being in the same room with a cat	218 (34.0)[a]	153 (37.3)[a]	
	Close proximity	398(62.0)[a]	213 (52.0)[b]	
Duration of exposure	Less than 0.5 h	15 (2.5)[a]	25 (6.2)[b]	**<0.001**
	0.5–2 h	264 (44.4)[a]	114 (28.4)[b]	
	2–6 h	257 (43.2)[a]	187 (46.5)[a]	
	>6 h	52 (9.9)[a]	76 (18.9)[b]	

Notes: Values in the same row with different superscript letters (a, b) indicate statistically significant differences (P < 0.05); values sharing the same letter are not significantly different. The P value represents the level of statistical significance.

Table 3 Clinical characteristics and timing of symptoms related to cat exposure.

Variables		Symptoms present with cat exposure (n: 410)
Symptoms*	Itching	110 (26.8)
	Tearing, ocular redness, and ocular pruritus	165 (40.2)
	Nasal congestion, rhinorrhea, sneezing, and nasal itching	149 (36.3)
	Cough	149 (36.3)
	Anaphylaxis	9 (2.2)
	Dyspnea	8 (2.0)
	Periorbital and/or facial angioedema	109 (26.6)
	Urticaria	66 (16.1)
Symptom onset time (n: 460)	<1 h	113 (24.7)
	1-6 h	143 (31.2)
	>6 h	201 (43.9)
	Unknown	1 (0.2)
Symptom duration	<2 h	2 (0.4)
	2-6h	21 (4.6)
	6-24 h	279 (61.1)
	>24h	155 (33.9)
Previous similar reactions to cat contact	No	24 (5.9)
	Yes	356 (86.8)
	Not reported	30 (7.3)

Note: *Multiple symptoms were observed in some patients.

Table 4 Univariate and multivariate logistic regression analysis of factors associated with symptom development after cat exposure.

Variables		Univariate analysis			Multivariate analysis		
		OR	95% CI	P	OR	95% CI	P
Age (months)		1.007	1.004-1.009	<0.001	-	-	-
Total IgE (IU/mL)		1.001	1.00-1.001	<0.001	-	-	-
Eosinophil count, $\times 10^9$/L		1.001	1.00-1.001	0.001	-	-	-
Eosinophil (%)		1.05	1.02-1.08	0.001	0.97	0.90-1.04	0.415
Cat-specific IgE (kU/L)		1.18	1.13-1.24	<0.001	-	-	-
Cat-specific IgE positivity		31.20	18.29-53.21	<0.001	23.22	11.62-46.39	**<0.001**
Dermatophagoides farinae positivity		1.59	1.23-2.07	<0.001	0.95	0.53-1.68	0.862
Dermatophagoides pteronyssinus positivity		1.65	1.28-2.13	<0.001	1.35	0.75-2.44	0.308
Grass pollen panel positivity		1.69	1.29-2.20	<0.001	1.38	0.80-2.39	0.240
Cat sensitization (mm)		1.38	1.30-1.46	<0.001	1.03	0.93-1.15	0.528
Dog sensitization (mm)		1.36	1.09-1.69	0.006	-	-	-
Grass paneli (mm)		1.09	1.01-1.17	0.021	-	-	-
Weed (mm)		1.24	1.08-1.43	0.002	-	-	-
Cereal pollen (mm)		1.77	1.17-2.67	0.006	-	-	-
Place of cat exposure*	At home	2.35	1.48-3.71	<0.001	-	-	-
	During a family visit	2.99	1.88-4.74	<0.001	-	-	-
Type of cat contact**	Shared household with a cat	3.74	1.78-7.85	<0.001	1.03	0.38-2.85	0.942
	Close proximity	9.02	3.81-21.35	<0.001	1.50	0.54-4.16	0.434
Duration of exposure		1.36	1.15-1.61	<0.001	-	-	-

Notes: OR: odds ratio; *outdoor exposure; **being in the same room with a cat.

Table 5 Cut-off values and diagnostic accuracy of cat prick test and specific ıge determined by ROC analysis.

Variables	Cut-off value	Sensitivity (%)	Specificity (%)	AUC	SE	P	95% CI
Cat sensitization (mm)	3.5	77.9	51.7	0.720	0.018	<0.001	0.685–0.754
	4.5	64.1	75.9				
	5.5	51.6	86.4				
Cat-specific IgE	0.68	74.5	91.8	0.849	0.018	<0.001	0.813–0.885
	1.05	71.4	93.0				
	1.99	68.7	93.7				

Notes: AUC: area under the curve; SE: standard error; 95% CI: 95% Confidence Interval; ROC: receiver operating characteristic.

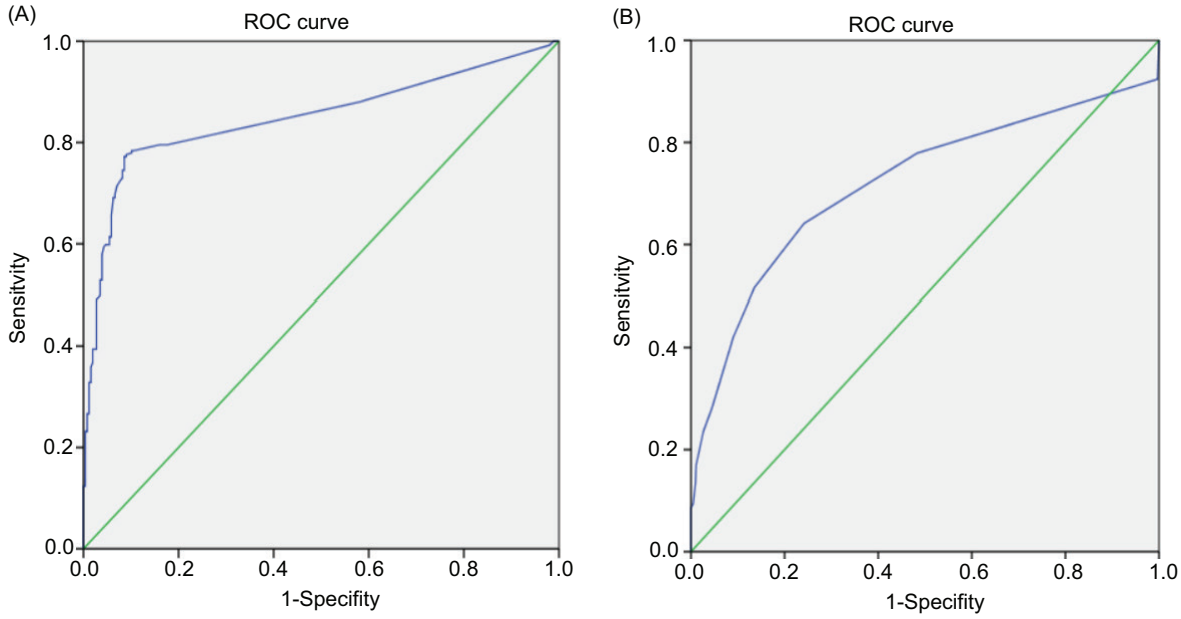

Figure 1 Receiver operating characteristic (ROC) curve demonstrating the diagnostic performance of cat-specific IgE and skin prick test (SPT) levels in predicting symptom development. (A) According to ROC analysis for cat-specific IgE, the area under the curve (AUC) was 0.849, with an optimal cut-off value of 1.05 kU/L, yielding a sensitivity of 71.4% and a specificity of 93.0% ($P < 0.001$). (B) According to ROC analysis for the cat SPT, the AUC was 0.720, with an optimal cut-off value of 4.5 mm, yielding a sensitivity of 64.1% and a specificity of 75.9% ($P < 0.001$).

regression analysis performed on the study data, no factor affecting the risk of systemic symptoms was identified ($P > 0.05$).

Discussion

This study evaluated markers predicting symptom development in cat-sensitized children. Among patients in the current study who were sensitized to cats, 39% were symptomatic upon animal exposure. In the literature, the prevalence of development of symptoms among cat-sensitized patients is reported to vary between 30% and 60% across different populations.[13-15]

Unlike the current study, these studies did not include an evaluation of cat-sIgE. In the current study, both SPT and sIgE assessments were performed, allowing for a more detailed and objective analysis of the relationship between sensitization and symptoms.

As patients identified as sensitive to cats based on diagnostic tests cannot always be defined as having cat allergies, it is necessary to determine clinically meaningful threshold values for SPT and cat sIgE.[6] Results of the current study showed that the positivity proportions of cat sIgE and SPT were significantly higher in symptomatic patients. The optimal cut-off values were determined as 1.05 kU/L for cat sIgE and 4.5 mm for SPT in terms of sensitivity and specificity. The present study shows that cat sIgE and SPT, at defined cut-off values, can distinguish symptomatic from asymptomatic patients and improve diagnostic accuracy.

In a study conducted on 60 adult patients with perennial allergic rhinitis, a cat SPT wheal size of >6.5 mm was

shown to predict a positive nasal challenge test with 71.11% sensitivity and 100% specificity.[16] In a study conducted by Zarei et al., it was noted that an SPT wheal diameter of ≥3 mm may overestimate true cat allergy, whereas a diameter of ≥6 mm may help to distinguish true allergy from mere sensitization.[3] While the studies conducted by Zarei et al.[3] and Al-Ahmad et al.[16] included fewer patients and utilized nasal challenge testing, the present study evaluated symptomatic and asymptomatic patients using real-life exposure-based data. Although nasal challenge tests are considered the gold standard in the diagnosis of cat allergy, their ability to reflect real-life conditions and their practicality are limited.[17,18]

Although a previous study reported that cat sIgE levels of <0.35 kU/L might be associated with clinical symptoms, such thresholds may lead to false-positive results because of low specificity.[19] In the current study, a cut-off value of 1.05 kU/L yielded both high sensitivity (71.4%) and high specificity (93.0%). Moreover, the current study differs from previous population-based studies by including a targeted patient population consisting of symptomatic children and by providing a comprehensive evaluation of exposure-related variables, such as the nature, duration, and setting of cat contact.

Many studies demondtrated that allergic diseases in childhood tend to increase with age. It is well known that sensitization often begins at an early age and becomes more apparent clinically over passage of time. In the present study, the age of children without symptoms upon cat exposure was determined as significantly lower than that of children with symptoms, and this difference was statistically significant. Similarly, in the BAMSE cohort study, the prevalence of cat sensitization increased with age, reported as 6.8%, 13.9%, and 19.8% at the age of 4, 8, and 16 years, respectively. The prevalence of allergic symptoms at the same age years was reported as 4.8%, 7.1%, and 11.2%, respectively.[6]

In polysensitized patients, symptoms were not assumed as solely related to cat exposure; instead, co-sensitization was evaluated systematically. Examining co-sensitizations to other aeroallergens in cat-sensitized patients is important for understanding the course of allergic symptoms. Previous studies have shown that cat sensitization is most frequently accompanied by sensitization to tree pollen, house dust mites, and dog allergens.[20] The current study investigated the association between co-sensitizations and development of symptoms in cat-sensitized patients.

In cat-sensitized individuals, co-sensitization to other aeroallergens may contribute to development of symptoms. The higher frequency of co-sensitization to house dust mites among patients reporting symptoms after cat exposure suggests that simultaneous indoor exposure to multiple allergens may increase the overall allergen burden and thereby trigger clinical symptoms.The higher frequency of grass pollen SPT positivity in the symptomatic group suggests that environmental factors accompanying cat exposure may influence clinical presentation. In particular, simultaneous exposure to different aeroallergens may increase the allergic inflammatory burden and lower the threshold for development of symptoms. Although some studies in the literature reported a possible association between Timothy grass sensitization and cat sensitization, these studies did not include symptom-based assessments.[21] In polysensitized individuals, an increased total allergen burden is associated with a higher risk of developing more severe and persistent respiratory allergic diseases. Some previous studies support the findings of the current study.[22,23]

The loss of significance of sensitization to certain aeroallergens in a multivariate model indicated that the clinical effects of these variables were not independent.

Cat sIgE positivity and higher cat sIgE levels were strongly associated with development of symptoms following cat exposure. The median level of cat sIgE in the symptomatic group was approximately 10 times higher than in the asymptomatic group. In a study using SPT and sIgE measurements, findings similar to the present study, individuals who developed allergic symptoms following cat exposure were found to have higher levels of cat sIgE compared to those without symptoms. These findings support the results of the current study.[13]

The multivariate analysis in the current study revealed that cat sIgE positivity was 23 times more prospective in the group that developed symptoms after cat exposure, compared to those without symptoms. Cat sIgE positivity was identified as the only independent and significant predictor of symptom development following cat exposure. These results suggested that cat sIgE positivity could serve not only as a marker of sensitization but also as a potential biomarker for predicting development of symptoms.

Risk factors for systemic reactions (anaphylaxis and dyspnea) following cat exposure were analyzed. According to the results of the univariate analysis, cat, *Dp,* and grass pollen panel SPT induration diameters, cat sIgE positivity, and asthma presence are associated with an increased risk of developing systemic symptoms. Allergic rhinitis, on the other hand, was identified as a factor reducing the risk of developing systemic symptoms. However, no variable independently predicted systemic symptoms in multivariate analysis. This finding could be related to the limited number of patients who experienced systemic reactions.

Pet allergens can spread not only through direct contact but also via clothing, shared spaces, and passive carriers. In the current study, a higher frequency of indoor cat exposure among patients who developed symptoms was consistent with the findings reported in previous studies. A previous study, similar to the current study, reported that individuals who developed allergic symptoms after cat exposure were found to have more frequent cat contact at home and less frequent exposure to cats in public spaces, compared to those without symptoms.[13] Another study identified cat ownership and close contact with cat owners as independent risk factors for the development of symptoms related to cat exposure.[24]

Pet allergens are passively transferred to public spaces.[2] However, in individuals exposed to cats outdoors, allergen exposure is typically of shorter duration and at lower concentrations. In contrast, continuous contact with cats in the home environment can lead to higher levels of allergen exposure. This may explain why individuals exposed to cats outdoors have a lower probability of developing allergic symptoms.

When evaluated according to cat breeds, contact with tabby cats was found to be less associated with development of symptoms. Nearly all non-tabby cats in Turkey are

kept indoors. Higher indoor allergen exposure may lead to increased symptom development in sensitized individuals. Prolonged and intense exposure to allergens in enclosed environments could be associated with the development of symptoms.[18,25] On the other hand, in the current study, cat breeds other than tabby cats were grouped into a single category, which included multiple different breeds. In addition, this group should be considered to represent a relatively small subset of the study population.

The primary limitation of the current study is its retrospective design. Nonetheless, a major strength lies in the comprehensive assessment of clinical, laboratory, and environmental exposure variables within a large pediatric cohort.

Conclusion

This study is among the few reports that provide a detailed evaluation of the relationship between cat sensitization and the development of clinical symptoms in children, utilizing both SPT and cat sIgE levels. Furthermore, it establishes diagnostic cut-off values and explores exposure patterns and contact characteristics. In clinical practice, the identified cut-off values may serve as valuable tools for accurately identifying symptomatic patients and minimizing unnecessary interventions. The finding that cat sIgE positivity emerged as the sole independent predictor of symptom development underscores its potential utility as a reliable biomarker in clinical decision-making, particularly in the differential diagnosis of symptomatic individuals.

Sources of Report

The authors declared that they didn't use any source of support.

Mandatory Disclosure on Use of Artificial Intelligence

The authors declare that no AI-assisted tools were used in the preparation of this manuscript. All references have been manually verified for accuracy and relevance.

Author Contributions

All authors contributed equally to this article.

Conflicts of Interest

The authors had no conflict of interest to declare. They also declared that they didn't use any off-label or unapproved drugs or products. Also, they didn't use any previous copyrighted material.

Funding

None.

References

1. Popescu FD, Ganea CS, Panaitescu C, Vieru M. Molecular diagnosis in cat allergy. World J Methodol. 2021;11(3):46–60. https://doi.org/10.5662/wjm.v11.i3.46
2. Konradsen JR, Fujisawa T, van Hage M, Hedlin G, Hilger C, Kleine-Tebbe J, et al. Allergy to furry animals: New insights, diagnostic approaches, and challenges. J Allergy Clin Immunol. 2015;135(3):616–25. https://doi.org/10.1016/j.jaci.2014.08.026
3. Zarei M, Remer CF, Kaplan MS, Staveren AM, Lin CK, Razo E, et al. Optimal skin prick wheal size for diagnosis of cat allergy. Ann Allergy Asthma Immunol. 2004;92(6):604–10. https://doi.org/10.1016/S1081-1206(10)61425-1
4. Kaya MŞ, Metbulut AP, Giniş T, Toyran M, Civelek E, Dibek Mısırlıoğlu E. The importance of skin prick test in differentiating cat sensitivities and allergies in children. Turk J Med Sci. 2023;53(4):865–71. https://doi.org/10.55730/1300-0144.5650
5. Burbach GJ, Heinzerling LM, Edenharter G, Bachert C, Bindslev-Jensen C, Bonini S, et al. GA2LEN skin test study II: Clinical relevance of inhalant allergen sensitizations in Europe. Allergy. 2009;64(10):1507–15. https://doi.org/10.1111/j.1398-9995.2009.02089.x
6. Asarnoj A, Hamsten C, Wadén K, Lupinek C, Andersson N, Kull I, et al. Sensitization to cat and dog allergen molecules in childhood and prediction of symptoms of cat and dog allergy in adolescence: A BAMSE/MeDALL study. J Allergy Clin Immunol. 2016;137(3):813–21. https://doi.org/10.1016/j.jaci.2015.09.052
7. Gültuna S. Clinical characteristics of cat sensitized adults, cat ownership and cat owners' attitudes. Allergy Asthma Proc. 2022;43(6):e65–71. https://doi.org/10.2500/aap.2022.43.220066
8. Clottu A, Mahdi Aljedani R, Spertini F. Allergies aux animaux à poils: Mythes et réalités [Allergy to furry animals: Myth and reality]. Rev Med Suisse. 2020;16(689):688–93. https://doi.org/10.53738/REVMED.2020.16.689.0688
9. Global Initiative for Asthma. Global strategy for asthma management and prevention 2020 [Internet]. Available from: https://ginasthma.org/wp-content/uploads/2020/06/GINA-2020-report_20_06_04-1-wms.pdf Accessed: November 4, 2024.
10. Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. Acta Derm Venereol. 1980;60:44–7. https://doi.org/10.2340/00015555924447
11. Brożek JL, Bousquet J, Agache I, Agarwal A, Bachert C, Bosnic-Anticevich S, et al. Allergic rhinitis and its impact on asthma (ARIA) guidelines-2016 revision. J Allergy Clin Immunol. 2017;140(4):950–8. https://doi.org/10.1016/j.jaci.2017.03.050
12. Bousquet J, Heinzerling L, Bachert C, Papadopoulos NG, Bousquet PJ, Burney PG, et al. Practical guide to skin prick tests in allergy to aeroallergens. Allergy. 2012;67(1):18–24. https://doi.org/10.1111/j.1398-9995.2011.02728.x
13. Kang SY, Yang MS, Park SY, Kim JH, Won HK, Kwon OY, et al. The role of allergen-specific IgE in predicting allergic symptoms on dog and cat exposure among Korean pet exhibition participants. World Allergy Organ J. 2020;13(12):100488. https://doi.org/10.1016/j.waojou.2020.100488
14. Evcen R, Çölkesen F, Yıldız E, Sadi Aykan F, Kılınç M, Akkuş FA, et al. Increasing prevalence of sensitization to cat/dog allergens in the COVID-19 pandemic. Int Arch Allergy Immunol. 2024;185(2):133–41. https://doi.org/10.1159/000534173
15. Liccardi G, Calzetta L, Baldi G, Berra A, Billeri L, Caminati M, et al. Allergic sensitization to common pets (cats/dogs) according to different possible modalities of exposure: An Italian multicenter study. Clin Mol Allergy. 2018;16:3. https://doi.org/10.1186/s12948-018-0081-z

16. Al-Ahmad M, Jusufovic E, Arifhodzic N, Nurkic J, Hanoun AL. Sensitization to cat: When is nasal challenge needed? Int Arch Allergy Immunol. 2019;179(2):108–13. https://doi.org/10.1159/000496835
17. Scadding GW, Eifan A, Penagos M, Dumitru A, Switzer A, McMahon O, et al. Local and systemic effects of cat allergen nasal provocation. Clin Exp Allergy. 2015;45(3):613–23. https://doi.org/10.1111/cea.12434
18. Dávila I, Domínguez-Ortega J, Navarro-Pulido A, Alonso A, Antolín-Amerigo D, González-Mancebo E, et al. Consensus document on dog and cat allergy. Allergy. 2018;73(6):1206–22. https://doi.org/10.1111/all.13391
19. Linden CC, Evans MD, Barrett EG, Tisler C, Lewis TC, Mukherjee B, et al. Analysis of allergen-specific IgE cut points to cat and dog in the Childhood Allergy Study. Ann Allergy Asthma Immunol. 2011;106(2):153–8. https://doi.org/10.1016/j.anai.2010.11.004
20. Wood RA, Johnson EF, Van Natta ML, Chen PH, Eggleston PA. A placebo-controlled trial of a HEPA air cleaner in the treatment of cat allergy. Am J Respir Crit Care Med. 1998;158(1):115–20. https://doi.org/10.1164/ajrccm.158.1.9712110
21. Can Bostan O, Cakmak ME, Kaya SB, Tuncay G, Damadoglu E, Karakaya G, et al. The association of timothy grass allergy and cat ownership on cat sensitization. Allergy Asthma Proc. 2022;43(3):220–5. https://doi.org/10.2500/aap.2022.43.220012
22. Gelardi M, Fiorella ML, Quaranta N, Landi M, Passalacqua G. Allergic rhinitis phenotypes based on mono-allergy or poly-allergy. Inflamm Res. 2015;64:373–5. https://doi.org/10.1007/s00011-015-0826-9
23. Ciprandi G, Incorvaia C, Puccinelli P, Soffia S, Scurati S, Frati F, et al. Characteristics of patients with allergic polysensitization: The POLISMAIL study. Eur Ann Allergy Clin Immunol. 2008;40(3):77–83. PMID: 19334371
24. Buyuk Yaytokgil S, Metbulut AP, Giniş T, Toyran M, Civelek E, Dibek Mısırlıoğlu E. Cat allergy in children and the effect of the COVID-19 pandemic. Allergy Asthma Proc. 2022;43(5):e31–9. https://doi.org/10.2500/aap.2022.43.220037
25. Butt A, Rashid D, Lockey RF. Do hypoallergenic cats and dogs exist? Ann Allergy Asthma Immunol. 2012;108(2):74–6. https://doi.org/10.1016/j.anai.2011.12.005