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ORIGINAL ARTICLE

Allergic diseases and sensitisation profiles among cat dander-sensitised patients in Malaysia

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Abstract

Introduction: Cats are among the most common household pets in Malaysia, and cat dander is a significant aeroallergen. This study aimed to estimate the prevalence of cat dander sensitisation, characterise allergic disease patterns across age groups, and explore the relationship between cat dander sensitisation and allergic multimorbidity. *Materials and Methods:* A retrospective cross-sectional study was conducted on laboratory records of patients tested for specific immunoglobulin E to cat dander between January 2023 and December 2024. Specific immunoglobulin E levels were measured using fluoroenzyme immunoassay on the Phadia ImmunoCAP 250 system. Demographic information, allergic diseases history, and co-sensitisation patterns were analysed. *Results:* Of 2840 patients tested, 30% (n=851) were sensitised to cat dander, with 817 included in the final analysis. Most sensitised patients had single allergic disease (asthma, allergic rhinitis, or eczema) (51.2%), followed by those with allergic multimorbidity (35.6%). Asthma was the most common allergic disease (25%), followed by the combination of asthma and allergic rhinitis (18.4%). There was a significant association between age group and allergic disease patterns ($p<0.001$), where eczema was more prevalent in children and allergic airway diseases increased with age. Allergic multimorbidity peaked among school-aged children. Polysensitisation (≥4 allergens) was observed in 65.9% of patients. House dust mite was the most common co-sensitised allergen (96.3%), followed by cockroach (84.8%), grass pollen (62.6%) and fungal (45.7%). *Conclusion:* Cat dander sensitisation affects nearly one-third of tested patients in Malaysia, and is frequently associated with polysensitisation. Age-specific disease patterns align with the atopic march paradigm, highlighting the need for targeted, age-appropriate intervention and prevention strategies.

Keywords: Cat dander sensitisation, allergic diseases, aeroallergen, multimorbidity, polysensitisation

INTRODUCTION

Over the years, the prevalence of allergic diseases has increased globally, including across Asian countries. These conditions, particularly eczema, have been increasingly reported among the younger age groups, likely due to rapid environmental and lifestyles changes.[1] Children are especially vulnerable to allergic multimorbidity due to genetics and environmental factors, including sensitisation to common indoor allergens, exposure to second-hand tobacco smoke, and air pollution.[2] Studies have shown that multimorbidity is associated with polysensitisation in children as compared to adults, suggesting that the pattern of allergic diseases may vary with age.[3,4] Early sensitisation to common aeroallergen also has been recognised as a risk factor for development of allergic diseases later in life.

Cat dander ranks as the second most indoor allergens after house dust mites in the development of allergic diseases such as asthma, allergic rhinitis, and eczema.[5-8] Allergies to pet dander, particularly cat dander, has been increasing with an estimated 10-20% of human adults are sensitised to cats.[9,10] Domestic cats are among the most common household pets in Malaysia, kept for both for companionship and cultural reasons, and constitute a substantial proportion of national pet population.[11]

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Although several studies have explored the relationship between pet exposure and allergic diseases, no clear consensus has been reached, as the development of allergic diseases is influenced by multiple factors, including genetic predisposition, timing of exposure, and environmental influences.[2,12-14] Despite increasing urbanisation, evolving environmental exposures, and the growing popularity of cats in Malaysia, local data integrating clinical phenotypes with laboratory-defined sensitisation patterns remain limited.

To address these gaps, we leveraged a national referral laboratory database to describe cat dander sensitisation and co-sensitisation profiles, particularly with common indoor allergens such as house dust mites and cockroaches, across both paediatric and adult age strata. Therefore, this study aims to characterise the patterns of allergic diseases and sensitisation profiles among cat dander-sensitised patients in Malaysia, and to explore the association between sensitisation patterns and allergic multimorbidity. The findings are expected to provide important insights into the burden and nature of cat-related allergies in the local population, aid in planning for effective prevention and management strategies.

MATERIALS AND METHODS

Study designs

We conducted a retrospective, cross-sectional analysis of anonymised laboratory records for all patients tested for specific immunoglobulin E (sIgE) to cat dander between January 2023 and December 2024. The study had obtained approval from the Medical Research and Ethics Committee (MREC), Ministry of Health Malaysia (MOH) (NMRR ID-25-01436-E70).

Data collection

The laboratory request forms of patients with positive sIgE to cat dander (>0.1 kU_A/L) were reviewed to collect information on demographic data (age, ethnicity, sex, and geographic location) and associated allergic diseases. Patients with incomplete laboratory forms or missing clinical information were excluded. Additionally, information on the lab records of serum total IgE and sIgE to other aeroallergens, including house dust mite, cockroach, grass pollen, and fungal allergens that were tested on patient were reviewed and retrieved if available from local diagnostic database system.

Measurement of sIgE concentration

The quantification of sIgE for cat dander (e1), house dust mites (*Dermatophagoides pteronyssinus*, d1 or *Dermatophagoides farinae,* d2), grass pollen (*Bermuda grass*, g2 or *Rye grass*, g5), fungal (*Aspergillus fumigatus,* m3 or *Alternaria alternata*, m6), and German cockroach, i6, were quantified using the fluoroenzyme immunoassay method with the ImmunoCAP® Phadia 250 System, (Thermo Scientific, Sweden) accordingly to the manufacturer's instructions. Serum total IgE levels were measured with a detection range of 2 -5000 kU/L. A positive sIgE tests was defined as >0.1 kU_A/L with an upper detection limit of 100 kU_A/L. For statistical analysis, values above the upper detection limit were top-coded to the maximum measurable value.

Allergen grouping and sensitisation definitions

Aeroallergens were categorised into five groups: cat dander, house dust mite, cockroach, grass pollen, and fungal. Patients were considered sensitised to a given group if they exhibited a positive sIgE to at least one allergen within that category. Monosensitisation referred to sensitisation to cat dander alone; oligosensitisation denoted sensitisation to 2-3 aeroallergen groups; and polysensitisation referred to sensitisation to 4 or more aeroallergen groups.[15]

Clinical presentations and allergic multimorbidity

Allergic multimorbidity was defined as the co-occurrence of at least two of the following: asthma, allergic rhinitis, and eczema. Other allergic conditions such as urticaria, food allergy, angioedema, anaphylaxis, and eosinophilia were categorised under other diseases and not included in the definition of multimorbidity.[4]

Age stratification

Age groups were stratified into four age groups: young children (<6 years), school-age (7-18 years), younger adults (19-49 years) and older adults (≥50 years).

Statistical analysis

Analyses were performed using IBM SPSS Statistics version 29.0 (IBM, Corp., Armonk, NY, USA). Baseline characteristics were summarised as counts (percentages) for categorical variables and as medians with interquartile range (IQRs) for skewed continuous variables. Associations between categorical variables were tested using

Pearson's Chi-square or Fisher's Exact test, as appropriate. Comparisons of skewed continuous variables across groups were conducted using the Kruskal-Wallis test with post-hoc pairwise comparisons. A two-sided p-value of < 0.05 was considered as statistically significant.

RESULTS

Demographic and geographic distribution

Between January 2023 and December 2024, a total of 2840 patients underwent sIgE testing for cat dander (e1). Of these, 1989 (70.0%) were not sensitised and 851 (30.0%) were sensitised to cat dander. After excluding patients with incomplete data, 817 sensitised patients were included in the final analysis (FIG 1). The mean age of the patients was 28 years, with an age range from 4 months to 84 years. Females comprised 61.3% (n=501) and males 38.7% (n=316). By ethnicity, 82.0% were Malay, 7.5% Indian, 7.0% Chinese and 3.5% others (TABLE 1). The distribution of cat dander-sensitised patients across hospitals in Malaysia varied by state, with the highest number of cases observed from Kuala Lumpur (21.5%), followed by Selangor (21.4%), and Kelantan (15.3%). These 3 states account for more than 50% of cases. Other states with notable cases included Johor (8.9%), Penang (5.9%) and Sarawak (4.7%) (FIG 2).

Allergic diseases patterns

Among the 817 patients, the median total IgE was 1034 kU/L (IQR: 402-3183.5 kU/L), with 16.4% having values >5000 kU/L. The median sIgE to cat dander was 1.14 kU_A/L (IQR: 0.26-9.58 kU_A/L), and 7.5% of patients had values >100 kU_A/L.

Among the cat dander-sensitised patients, 51.2% (n=418) had a single allergic disease, either asthma, allergic rhinitis, or eczema, while 35.6% (n=290) had allergic multimorbidity. Asthma alone was the most common allergic disease, affecting 25% (n=204) of patients, while a combination of asthma and allergic rhinitis was the most prevalent pattern among the multimorbid group (18.4%, n=150) (TABLE 1).

Age-specific trends showed that eczema peaked in young children at (43.5%, n=54), and a declining trend in school-aged (12.3%, n=26), younger adults (8.4%, n=28) and older adults (4%, n=6). In contrast, asthma increased with age: older adults (48.3%, n=72), younger adults (28.5%, n=95), school-aged (13.7%, n=29) and young children (6.5%, n= 8) (TABLE 2 & FIG 3).

Allergic multimorbidity was most prevalent among school-aged children (FIG 4), with asthma and allergic rhinitis (24.6%, n=52) being the most common combination. The triple combination of asthma, allergic rhinitis, and eczema (10.9%, n=23) were also highest in this age group, further supporting that school-aged children were more prone to multimorbidity. There was a statistically significant association between age groups and pattern of allergic diseases (X^2=211.419, df=21, p<0.001) among the cat dander-sensitised patients, where eczema predominates in childhood and allergic airway diseases (asthma and allergic rhinitis) increased with age. Among the diseases classified under "other", urticaria was the most common presenting condition, accounting for 63% (n=69) of cases in this category, while allergic conjunctivitis comprised only 11% (n=12).

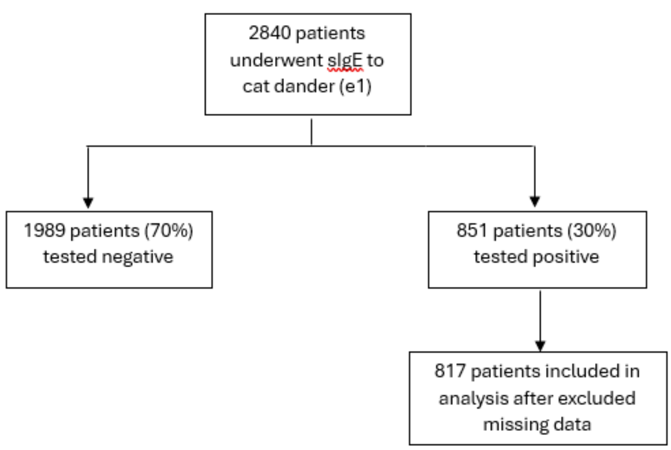

FIG. 1: Patient recruitment flowchart.

TABLE 1: Demographic characteristics and summary of allergic diseases among the cat dander-sensitised patients (N=817)

Variable		**N**	**%**
Gender	Male	316	(38.7)
	Female	501	(61.3)
Ethnicities			
	Malay	670	(82.0)
	Indian	61	(7.5)
	Chinese	57	(7.0)
	Others	29	(3.5)
Age Groups			
	<6 years	124	(15.2)
	7-18 years	211	(25.8)
	19-49 years	333	(40.8)
	>50	149	(18.2)
Allergic diseases			
	Asthma (A) only	204	(25.0)
	Allergic rhinitis (AR) only	100	(12.2)
	Eczema (EC) only	114	(14.0)
	A & AR	150	(18.4)
	A & EC	36	(4.4)
	AR & EC	39	(4.8)
	A & AR & EC	65	(8.0)
	Others:	109	(13.3)
	Urticaria	69	
	Allergic con-junctivitis	12	

Sensitisation patterns

Among patients who underwent testing for all five groups of aeroallergens (n=375), polysensitisation was common in all age groups (65.9%, n=247), followed by oligosensitisation (31.7%, n=119) and monosensitisation (2.4%, n=9) (FIG 5). Monosensitisation to cat dander was mostly seen in younger adults (n=8). The distribution of total IgE levels differed significantly among the three sensitisation groups ($p<0.01$), with polysensitisation patients exhibiting higher total IgE levels (FIG 6). This association remained significant across all age groups.

The majority of patients were sensitised to all five groups of aeroallergens (37.9%, n=142). This was followed by sensitisation to four groups of aeroallergens (cat dander, house dust mites, grass pollens, and cockroach) in 22.4% (n=84) and sensitisation to three groups of aeroallergens (cat dander, house dust mites, and cockroach) at 19.2% (n=72) (FIG 7).

Among the single-disease patients, 69.3% were polysensitised versus 60.2% (n=100) of multimorbid patients. Within the single-disease group, asthma was the most prevalent condition among polysensitised patients (n=114/189). Oligosensitisation was more frequent in the multimorbid group (38.0% vs. 28.6%). Cat dander sensitisation without co-sensitisation to other aeroallergens was rare, observed in 2.1% of single-disease patients and 1.8% of multimorbid patients. No significant association was found between the number of sensitisation and disease status ($p=0.158$) (TABLE 3).

The co-sensitisation pattern among cat-sensitised patients reveals that house dust mite

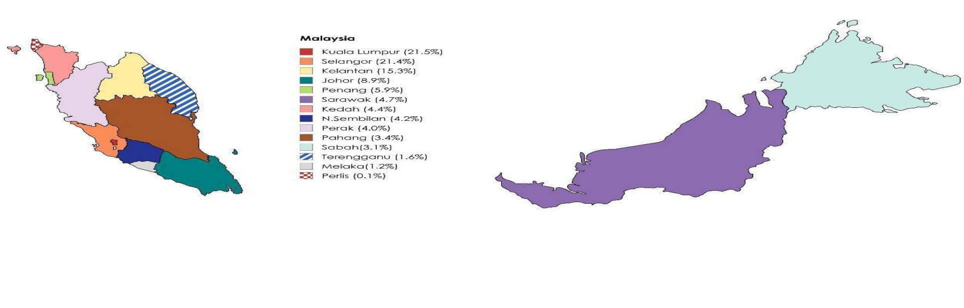

FIG. 2: Geographical distribution of cat dander sensitisation across hospitals in Malaysia by state. (Created with mapchart.net)

TABLE 2: Distribution of single-disease and multimorbidity phenotypes by age groups

	A	AR	EC	A+AR	AR+EC	A+EC	A+AR+EC	Others
Young children	8 (6.5%)	7 (5.6%)	54 (43.5%)	11 (8.9%)	5 (4.0%)	9 (7.3%)	12 (9.7%)	18 (14.5%)
School-aged	29 (13.7%)	36 (17.1%)	26 (12.3%)	52 (24.6%)	13 (6.2%)	10 (4.7%)	23 (10.9%)	22 (10.4%)
Younger Adult	95 (28.5%)	50 (15.0%)	28 (8.4%)	52 (15.6%)	20 (6.0%)	10 (3.0%)	25 (7.5%)	53 (15.9%)
Older Adult	72 (48.3%)	7 (4.7%)	6 (4.0%)	35 (23.5%)	1 (0.7%)	7 (4.7%)	5 (3.4%)	16 (10.7%)

(Abbreviation: A= asthma, AR= allergic rhinitis, EC= eczema, Others= other allergic condition such as urticaria, allergic conjunctivitis, eosinophilia, etc.)

was the most prevalent, with 96.3% (n=772/802) of patients exhibiting co-sensitisation to at least one of the house dust mite species (*D. pteronyssinus or D. farina*). Additionally, 84.8% (n=509/600) of cat dander-sensitised patients also had co-sensitisation to cockroach, followed by grass pollen sensitisation (g2- *Bermuda grass* or g5- *Rye grass)* in 62.6% (n=424/677) of patients. Fungal co-sensitisation to either *Aspergillus fumigatus* (m3) or *Alternaria alternata* (m6) was the least common, affecting 45.7% (n=213/466) of patients (TABLE 4).

DISCUSSION

This retrospective study demonstrates that cat dander sensitisation affects 30% of patients undergoing allergy testing in Malaysia, with strong associations between age group and allergic disease patterns (p<0.01).

Prevalence of cat dander sensitisation

Cat dander sensitisation rates vary geographically. European cohorts report rates between 10–30% in the general population and higher in atopic patients.[16] In Asian populations, prevalence tends to be lower overall, but sensitisation remains clinically significant. A Singaporean study showed cat dander sensitisation in 2.9% of allergic patients, while in Thailand, sensitisation was reported in 30–40%.[17-18] In our study, 30% had cat dander sIgE positivity with highest numbers from Kuala Lumpur (21.5%), followed by Selangor (21.4%), Kelantan (15.3%), Johor (8.9%), Penang (5.9%), Sarawak (4.7%) and Kedah (4.4%). This distribution may reflect

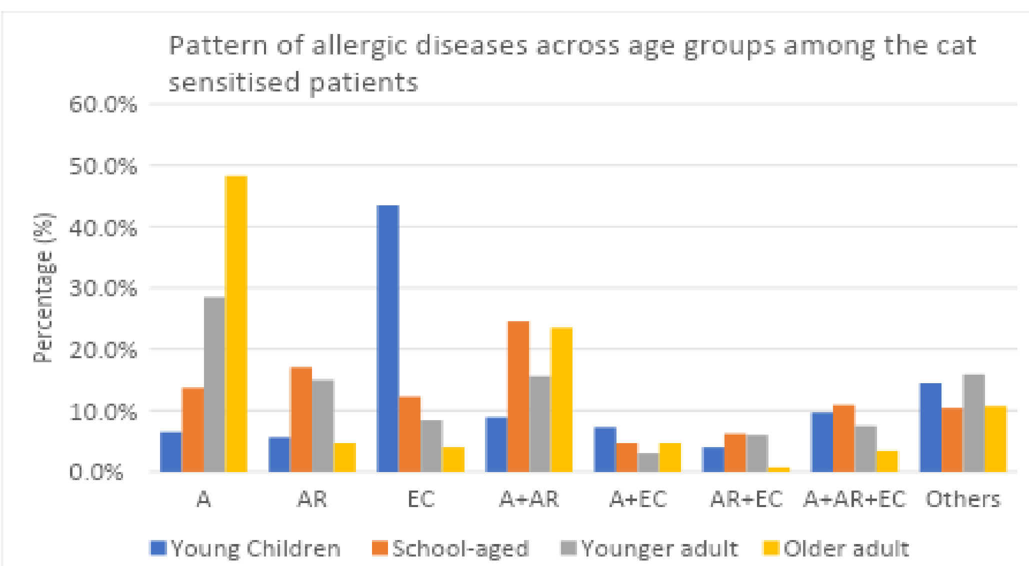

FIG. 3: Proportions of allergic disease phenotypes by age groups (p<0.001). A= asthma, AR= allergic rhinitis, EC= eczema, Others= other allergic conditions such as urticaria, allergic conjunctivitis, eosinophilia, etc.

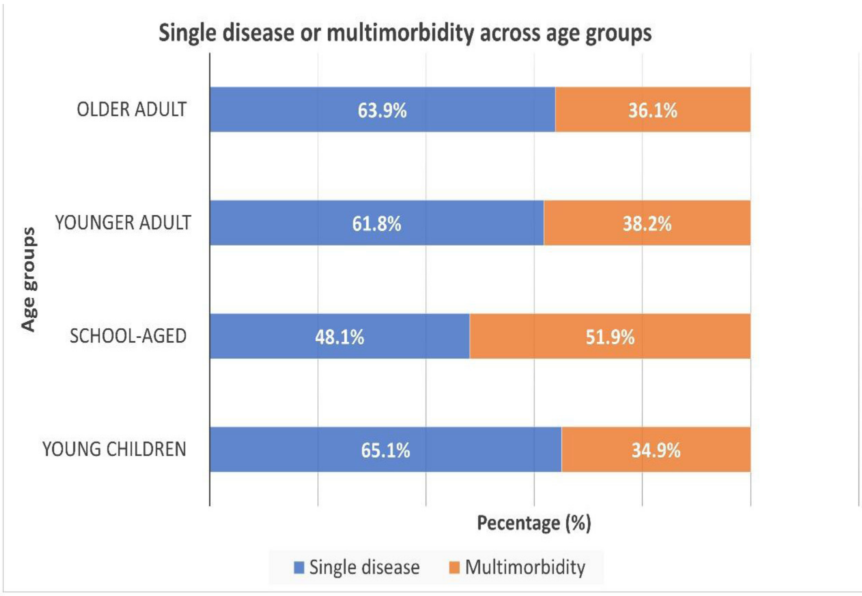

FIG. 4: Percentage of patients with a single allergic disease versus allergic multimorbidity across age groups.

increased pet ownership in urban areas of Malaysia and/or the persistent presence of cat allergens in the environment, even without direct cat exposure.[19] However, these differences may be influenced by confounding factors such as population density, healthcare accessibility, and awareness of allergy testing.

There are limited studies investigating aeroallergen sensitisation profiles among the Malaysian population. Kttafah *et al*. reported on aeroallergen sensitisation among the community in Perak, revealing highest sensitisation to house dust mite (HDM), followed by German cockroach, fungi and cat dander.[20] Similarly, studies among allergic rhinitis and asthma patients in Kuala Lumpur showed sensitisation rate as high as 70%-90% to HDM, followed by cat fur (20-42%), mixed cockroach (8-36%), mixed grass (7-8%) and *Aspergillus fumigatus* (0.7%).[21,22] In addition, a prevalence study among Malaysian office workers reported that HDM allergy affected 50% of individuals and cat allergy 25.5%, with both allergens showing a significant association with asthma and rhinitis symptoms.[23]

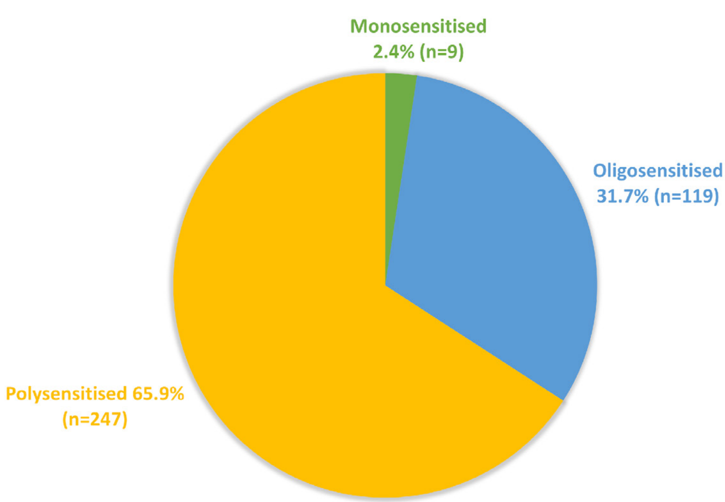

FIG. 5: Category distribution of sensitisation (monosensitisation, oligosensitisation and polysensitisation).

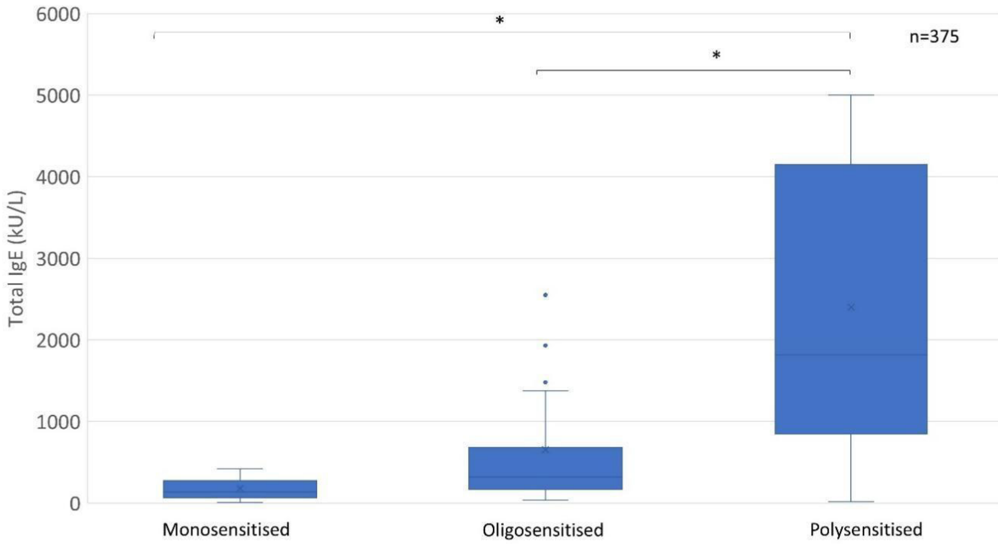

FIG. 6: Comparing Total IgE levels by sensitisation category (*p<0.01).

Pattern of sensitisation among cat dander-sensitised individual

Cat dander sensitisation often co-occurs with sensitisation to other aeroallergens. Nearly two-thirds (65.9%) of cat-sensitised patients were polysensitised, with the highest co-sensitisation to house dust mites (96.3%). This is consistent with the high background prevalence of dust mite sensitisation in tropical Asia.[24] Our study also demonstrates a high rate of polysensitisation among cat dander–sensitised patients, with frequent co-sensitisation to house dust mites, cockroaches, grass pollen, and fungal allergens. The presence of co-sensitisation to perennial allergens such as house dust mite and cockroach, may further contribute to a more severe and

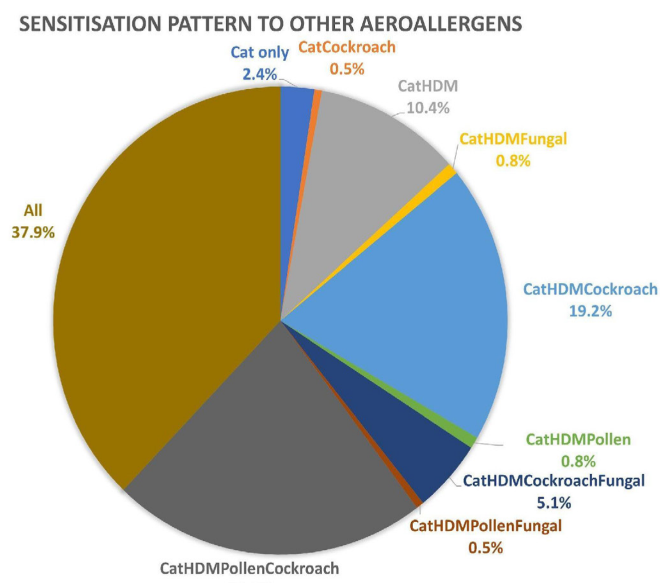

FIG. 7: Sensitisation patterns to other groups of aeroallergens among patients who tested for all five allergen groups (n=375). The majority of patients were sensitised to all five aeroallergen groups. HDM = house dust mite, cat = cat dander

TABLE 3: Number of sensitisations among patients with single disease or multimorbidity

	Single disease (n=189)	Multimorbidity (n=166)	p-value
Monosensitised to cat dander only	4 (2.1%)	3 (1.8%)	0.158
Oligosensitised (2-3 allergen groups)	54 (28.6%)	63 (38.0%)	
Polysensitised (≥4 allergen groups)	131 (69.3%)	100 (60.2%)	

sustained disease course.[25-27] Furthermore, polysensitisation is a well-established marker of greater disease severity and increased healthcare utilisation.[28] Ha EK *et al.* showed that polysensitised children have higher IgE levels, broader reactivity, and are more likely to develop multimorbid disease, supporting our findings of significant higher total IgE in the polysensitised group.[3] In the context of the allergic march, polysensitisation may serve as an amplifier, accelerating the transition from isolated eczema in childhood to complex multimorbid conditions such as asthma–rhinitis overlap in adolescence and adulthood. Patients with polysensitisation often exhibit earlier disease onset, greater disease persistence, and increased likelihood of developing allergic multimorbidity.[2,4,28]

Allergic multimorbidity

Among the cat dander-sensitised patients in the present study, 97.9% of those with single allergic disease and 98.2% of those with allergic multimorbidity were co-sensitised to other aeroallergens. Previous studies have demonstrated a strong association between allergic multimorbidity and polysensitisation, especially in children.[3,4] More importantly, allergic multimorbidity and polysensitisation have been found to be associated with greater persistence and severity of allergic diseases compared to monosensitised or non-sensitised individuals.[29] However, our study did not find a statistically significant association.

We also found that 35.6% of cat dander–sensitised patients had multimorbid allergic diseases. This is consistent with the MeDALL project in Europe, which demonstrated that allergic multimorbidity is common and often more persistent than single-disease phenotypes.[30] A study by Li *et al.* also reported that allergic multimorbidity was more common among children and adolescents than in adults in the Chinese population.[31] This is consistent with our finding, where allergic multimorbidity was most prevalent among school-aged children. This fact emphasises that allergic multimorbidity emerges more frequently with increasing age, reflecting the tendency for overlapping phenotypes as allergic disease matures. The high rate of asthma–rhinitis multimorbidity observed among cat dander–sensitised patients strongly supports the “one airway, one disease” hypothesis, which postulates that the upper and lower airways form a single inflammatory continuum with overlapping immunological pathways and environmental triggers.[32] This concept has important clinical implications, as uncontrolled rhinitis can exacerbate asthma, and conversely, optimal management of allergic rhinitis may improve asthma control. Therefore, clinicians should approach diagnosis and treatment holistically, recognising that effective disease management requires simultaneous attention to both upper and lower airway inflammation.

Furthermore, the age-related distribution of allergic diseases in our cohort reflects the dynamic, age-dependent evolution of allergic diseases, consistent with the concept of the

TABLE 4: Co-sensitisation pattern to other aeroallergens among cat-sensitised patients

	Positive test/ Total number of tests done	Percentage (%)
House dust mite	772/802	96.3
Cockroach	509/600	84.8
Grass Pollen	424/677	62.6
Fungal	213/466	45.7

allergic march, in which eczema and food allergy are more prevalent in early childhood, followed by the emergence of respiratory allergies such as allergic rhinitis and asthma later in life.[33] The predominance of eczema in younger children in our study, with a subsequent shift toward airway diseases in older age groups, underscores this natural progression thus highlighting the skin as the first target organ of allergic inflammation. This temporal shift illustrates the progression of allergic inflammation from cutaneous to respiratory manifestations, driven by genetic susceptibilities, immunological dysregulation, and cumulative environmental exposures.[34] Allergen exposure through the skin is believed to trigger a systemic immune response, leading to the activation of Langerhans cells, which migrate to lymph nodes and stimulate Th2 cells. These Th2 cells then circulate throughout the body, reaching various sites, including the respiratory system. Upon allergen inhalation, local dendritic cells process and present the allergens, while the systemic elevation of IL-4, IL-5, and IL-13 promotes a Th2-dominant immune environment, further enhancing Th2 cells. This immune cascade results in recruitment of eosinophils, increased IgE production, and amplification of allergic inflammatory response.[35]

Animal dander and house dust mites are important aeroallergens involved in the atopic march and are associated with an increased likelihood of developing allergic diseases in eczema patients.[25,26] Therefore, early detection of sensitisation to animal dander and dust mites in young children with eczema may aid in identifying those at higher risk for disease progression and development of asthma. Cat dander sensitisation also has been linked to respiratory allergic diseases in children and bronchial hyperresponsiveness in atopic adults, with high-level exposure accounting for up to 30% of asthma attacks among sensitised patients.[36-39] A meta-analysis of 9 European birth cohorts also found a significant association between cat and dog sensitisation in school-aged children with asthma.[40] Thus, understanding the age-dependent patterns is critical not only for explaining epidemiological trends but also for shaping preventive and therapeutic approaches across the lifespan.

Challenges of allergen avoidance in cat dander-sensitised patients with multimorbidity

The American Academy of Allergy, Asthma and Immunology recommend allergen avoidance as the most effective management of cat and dog allergy.[41] However, the effectiveness of pet avoidance as a strategy in preventing allergic diseases has been questioned in recent literature, as the relationship between cat dander sensitisation and allergic diseases is complex and remains controversial.[42] A recent systematic review by Indolfi *et al*. examining early exposure to cats and dogs and its effect on the development of allergy and asthma in children reported mixed outcomes, suggesting that pet avoidance may not be a reliable strategy for preventing atopic disease in children and concluded a protective association between early pet exposure and food allergy prevention.[12] One cohort study found that high cat allergen exposure was associated with elevated serum IgG and IgE level to cat dander in school-aged children, with IgE sensitisation being a risk factor for childhood asthma. However, it was noteworthy that children with high IgG levels to cat allergens without IgE sensitisation had a lower risk of wheezing.[43] This IgG response is thought to reduce allergic diseases by shifting the immune system from a T-helper 2 (Th2) response to a T-helper 1 (Th1) response, leading to immune tolerance.[44] Supporting this, large prospective studies have suggested that living with cat or dog during childhood during the first year of life does not increase the risk of allergic diseases and may even have a protective effect.[45-47] This may be linked to the hygiene hypothesis, which proposes that lack of microbial exposure early in life can lead to an increased risk of allergic diseases due to inadequate immune system stimulation.[6]

Nevertheless, the development of allergic diseases in children is multifactorial, influenced by factors such as early onset persistent eczema and disease severity, parental atopy, polysensitisation, urban living environments and genetic mutations that impair epithelial barrier function.[48] In addition, filaggrin (FLG) mutation has been linked to eczema in children and has been shown to be enhanced by early-life cat exposure, suggesting that genetic predisposition plays a significant role.[14,49,50]

Future directions in cat allergy research

As the prevalence of cat dander sensitisation continues to rise, there is a growing need to refine diagnostic and therapeutic strategies for cat-allergic patients. Component-resolved diagnosis (CRD) has become a modern tool in allergy diagnostics, enabling clinicians to distinguish true sensitisation and cross-reactivity with other mammalian allergens. The high rate of co-sensitisation among cat dander-sensitised patients suggests that aeroallergen often coexist in the same environment, making cross-reactivity inevitable. Currently World Health Organization (WHO) recognises eight Felis domesticus molecular allergens (Fel d1 to Fel d8), but only Fel d1, Fel d2, Fel d4 and Fel d7 are commercially available for clinical use.[51] Fel d1 is the most important cat allergen, secreted by feline sebaceous glands of skin and salivary glands. Its small particle size (2.5-5 µm) and heat stable nature allow it to remain airborne for extended periods, making it easily inhaled and capable of inducing IgE immune response.[46] As Fel d1 is species-specific biomarker to cat, positive to Fel d 1 is considered true cat sensitisation.[52] Fel d4 and Fel d7 belong to the lipocalin protein family, primarily found in cat saliva, and serve as biomarkers of cross-sensitisation to other animal lipocalins. Fel d2, a serum albumin is present in cat dander, serum, and urine. It serves as a biomarker of sensitisation to non-human serum albumin, often cross-reacting with porcine, canine, and equine albumins.

Molecular sensitisation patterns carry prognostic value as IgE to Fel d1 have been associated with a threefold increased risk of developing asthma in cat-allergic children, and polysensitisation to cat molecular components correlates with more severe asthma and greater bronchial responsiveness.[53-55]

Although allergen avoidance remains the primary approach for managing cat allergy, it is not always feasible as cat dander allergens are airborne and can persist in the environment without cats. Besides that, avoidance may not be acceptable for individuals who already own cats. Pharmacological treatment such as antihistamine, corticosteroid, mast cell stabiliser, and anti-leukotrienes can only provide temporary symptoms relief, whereas allergen immunotherapy (AIT) remains the only potential disease-modifying therapy for IgE-mediated allergic diseases and is recommended by the European Academy of Allergy and Clinical Immunology (EAACI) for patients with moderate to severe allergic rhinitis and asthma.[56] Immunotherapy with cat dander extract has been shown to reduce symptoms in cat allergic patients with rhinoconjunctivitis, allergic rhinitis and asthma, with improvement in lung function and reduce need for rescue medication.[57-59] CRD can be used to guide the suitability of AIT by identifying the specific sensitisation. Among the cat dander-sensitised patients Fel d 1 was the most detected molecular allergen and immunotherapy using Fel d1-derived peptide has also demonstrated reduction in ocular and nasal symptoms.[60] However, there is still limited high quality evidence on the effectiveness and safety profile of cat AIT, which warrants further clinical trials.[61] Further research should also explore whether AIT can prevent the progression of allergic diseases.

Limitation

This study provides an overview of cat dander sensitisation in Malaysia that may help guide future research directions. However, this study has several limitations. The data collected from laboratory request forms, which may contain inaccuracies or missing information. Besides that, no data on cat exposure, cat ownerships and family history of atopy were recorded, hence unable to correlate sensitisation with other potential contributing factors. The geographic distribution of cat dander sensitisation may not accurately reflect the true prevalence due to varying levels of awareness of diagnostic testing among clinicians. Furthermore, no in vivo skin prick tests were performed to complement the specific IgE findings, and sensitisation alone does not necessarily indicate clinical allergy to cat dander.

CONCLUSION

Our findings are consistent with global reports indicating that cat dander sensitisation is common among patients with allergic diseases and is associated with greater disease complexity. In this study, cat dander represented a significant aeroallergen, particularly among patients with asthma, which was the most frequent clinical presentation observed. These results underscore the importance of integrating allergen profiling into routine diagnostic workup, as identifying polysensitised children could provide prognostic insights and support more tailored and intensive management strategies. Taken together, the patterns we observed illustrate the dynamic interplay among age, allergic multimorbidity, and polysensitisation in the expression of allergic disease. Early individualised intervention strategies, including allergen avoidance, patient education, optimised pharmacotherapy, and possibly immunomodulatory approaches, may help modify the disease course.

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