Original Article

Clinical evaluation of long-term efficacy of house dust mite subcutaneous immunotherapy in children with allergic asthma

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Background: Allergen immunotherapy (AIT) is the only cause-specific treatment for allergic asthma (AA), and the efficacy of AIT has been widely recognized. Most previous studies have focused on evaluating the efficacy of AIT up to 10 years after treatment. Few studies have reported the long-term efficacy (more than 10 years after treatment) of subcutaneous immunotherapy (SCIT) in children with AA who were sensitized to a single allergen or multiple allergens. The aim of this study was to investigate the long-term efficacy of house dust mite (HDM) SCIT in children with single and multiple allergies, and to provide reliable data on the long-term efficacy of SCIT in children with AA.

Methods: Forty-six AA children (aged 5–14 years) who had completed 3 years of standardized HDM SCIT were assigned to a monosensitization group (n=22) or a polysensitization group (n=24). The asthma symptom score (ASS), rhinitis symptom score (RSS), total symptom score (TSS), visual analog scale (VAS), Pediatric Asthma Quality of Life Questionnaire (PAQLQ), Asthma Control Questionnaire (ACQ), and adverse reactions were evaluated before treatment, at the end of treatment and at 7, 10, and 15 years after SCIT.

Results: Compared with baseline scores, the ASS, RSS, TSS, VAS, PAQLQ, and ACQ of all patients were significantly improved at the end of SCIT and at 7, 10, and 15 years after SCIT. Moreover, there was no significant difference between the monosensitization group and the polysensitization group.

Conclusions: The significant clinical outcomes achieved by SCIT persisted for 15 years after treatment was completed.

Keywords: Allergic asthma (AA); polysensitivity; allergen-specific immunotherapy (AIT); children

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Introduction

Allergic asthma (AA) is a common chronic airway inflammatory disease in children that is induced by allergens. AA is characterized by airway hyperreactivity, reversible airflow restriction and airway remodeling. Clinically, it often manifests as repeated wheezing, shortness of breath and other symptoms, which can be alleviated by themselves (1). AA accounts for more than 90% of childhood asthma cases (2). Moreover, compared with other types of asthma, AA is more likely to develop into moderate and severe asthma because of the long course of disease caused by repeated symptoms during treatment (3). As the most common inhalation allergen, the number of house dust mite (HDM) allergic patients, worldwide, is approximately 65–130 million (4), and these mites are mainly inhaled via respiratory inhalation in the airway, triggering systemic Th2 inflammation—a common pathway underlying

both respiratory and cutaneous sensitization. This process sustains inflammatory responses, leading to allergic reactions in the respiratory tract and skin. Notably, according to skin prick tests (SPT) and clinical history, most patients with AA typically have other positive allergens besides HDMs (5-7). Polysensitization is related to disease severity, and in children with asthma, it is more likely to progress to refractory asthma (8). Treatment strategies for AA include: allergen avoidance, patient education, drug therapy and allergen-specific immunotherapy (AIT) (9). Unlike other pharmacological therapies, AIT is currently the only treatment that addresses the natural progression of AA at its root cause by inducing long-term immune tolerance to allergens (10), primarily including subcutaneous immunotherapy (SCIT) and sublingual immunotherapy (SLIT).

SCIT is now considered the most widely used form of AIT for children with HDM sensitized AA. By gradually increasing the dose of allergen extract, the body slowly and continuously stimulates the immune function and establishes immune tolerance. The core mechanisms include the induction of allergen-specific regulatory T cells (Tregs) that produce anti-inflammatory cytokines, the production of allergen-specific IgG4 blocking antibodies, and the reduction of effector cell reactivity, such as mast cells and basophils. This remodeling results in antigen-specific inhibition of the allergic reaction upon subsequent natural exposure to the allergen (10,11), thus strengthening the control of asthma and reducing asthma symptoms. Even after completing treatment, SCIT still has a long-term stable effect. The long-term benefit is an important consideration in the recommendation of any immunotherapy, and most studies on AIT have evaluated its efficacy within 5 years after the discontinuation of treatment (12-14). Although Ren *et al.* assessed the efficacy of AIT beyond 10 years (up to 13 years) after discontinuation, such long-term follow-up studies are relatively scarce (15). In addition, although polysensitization is a very common clinical phenomenon, there is a lack of data on the clinical efficacy of SCIT in children with polysensitized AA, especially long-term efficacy. At the same time, it is not known whether patients with monosensitization benefit from AIT compared with those with polysensitization (16,17). To investigate the long-term efficacy of SCIT in children with single and multiple allergies, we conducted a retrospective analysis of 60 children with AA who were sensitized to HDM and supplemented the efficacy data of SCIT in children aged 10 to 15 years, providing reliable data for the long-term efficacy of SCIT in patients with AA. We present this article in accordance with the STROBE reporting checklist (available at https://tp.amegroups.com/article/view/10.21037/tp-2025-313/rc).

Highlight box

Key findings

- We found that children with asthma in both the multi-sensitization group and the single-sensitization group showed significant improvement up to 15 years after the end of subcutaneous immunotherapy (SCIT). Furthermore, there was no significant difference between the single sensitization group and the multiple sensitization group.

What is known and what is new?

- Allergen-specific immunotherapy is currently the only treatment that addresses the natural progression of allergic asthma (AA) at its root cause, primarily including SCIT and sublingual immunotherapy.
- The significant clinical outcomes achieved by SCIT persisted for 15 years after treatment was completed.

What is the implication, and what should change now?

- SCIT has significant clinical efficacy in the treatment of AA, and this efficacy may last for up to 15 years.

Methods

Ethical statement

The study was conducted in accordance with the Declaration of Helsinki and its subsequent amendments. The study was approved by the Central Ethics Committee of Shanghai Children's Hospital (No. 2020R140-F01) and informed consent was taken from all children's legal guardians.

Study design and population

This retrospective cohort study included sixty children who were diagnosed with HDM-sensitized AA with allergic rhinitis and who received HDM SCIT at Shanghai Children's Hospital from January 2005 to December 2013. All patients were recruited through the respiratory outpatient clinic and posters, enrolled after a comprehensive assessment by clinicians, and all completed a 3-year course of SCIT alongside conventional asthma treatment (including allergen avoidance and regular inhaled corticosteroids as prescribed by physicians). First, the asthma symptom score (ASS), rhinitis symptom score (RSS), visual analog scale (VAS), paediatric asthma quality of life questionnaire

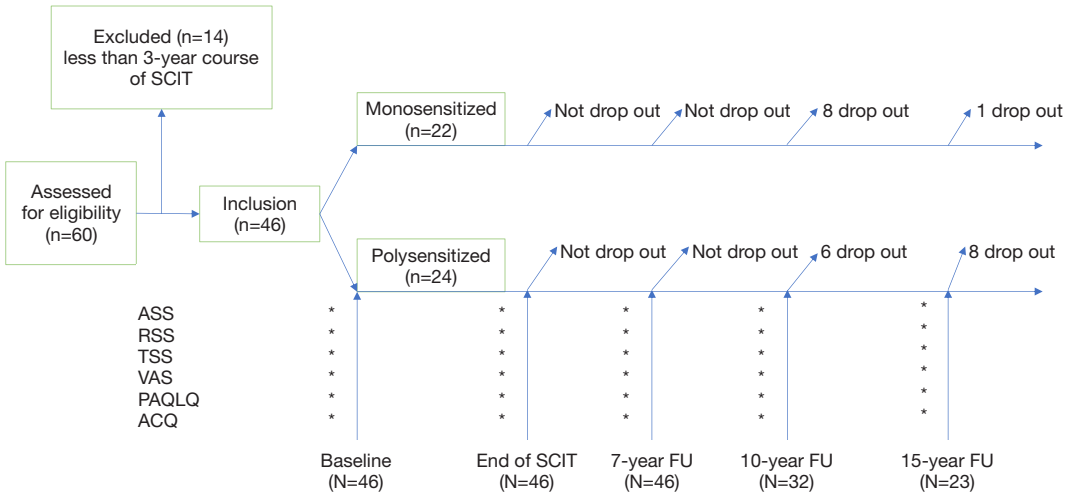

Figure 1 Study design showing the flow of participants through each stage of the study. Monosensitized: only sensitive to Der p; Polysensitized: sensitized to Der p and other coexisting inhaled allergens. ACQ, Asthma Control Questionnaire; ASS, asthma symptom score; Der p, *Dermatophagoides pteronyssinus*; FU, follow-up; PAQLQ, Pediatric Asthma Quality of Life Questionnaire; RSS, rhinitis symptom score; SCIT, subcutaneous immunotherapy; TSS, total symptom score (ASS + RSS); VAS, visual analog scale.

(PAQLQ), and Asthma Control Questionnaire (ACQ) of all patients were collected at baseline, at the end of treatment, and 7, 10, and 15 years after SCIT was discontinued. Patients were subsequently divided into a single dust mite allergen group and a multiple allergen sensitization group (dust mites combined with other allergens, such as: common environmental allergens: cockroach, cat dander, dog dander, short ragweed, mugwort, amaranth, sturgeon, mixed grasses (rye grass), white mulberry, mold mix, tree pollen and common food allergens: mango, soybean, cashew, peanut, beef, lamb, shrimp, crab, cod, lobster, salmon). According to the allergen SPT (≥++, or a wheal diameter ≥3 mm) or serum HDM-specific IgE (sIgE) level (≥ grade 2). In SPT, the panel of inhalant allergens is relatively standardized, typically including HDM (*Dermatophagoides pteronyssinus*), dust mite (*Dermatophagoides farinae*), pollen groups, molds, animal dander, cockroach, and feathers. These allergen extracts are typically used by hospitals. In contrast, food allergens for SPT are not predefined; parents often bring fresh food samples to the hospital for testing. Serum-specific IgE (sIgE) testing covers the common food and environmental allergens mentioned above, particularly those relevant to polysensitized groups. The scores of patients after treatment were compared with those before treatment. The inclusion criteria were as follows: (I) conforming to the guidelines for the diagnosis and treatment of AA and allergic rhinitis (18); (II) positive SPT for *Dermatophagoides pteronyssinus* (Der p) or specific IgE (sIgE) level against Der p ≥0.7 KU/L, with or without other positive allergens; (III) aged 5–17 years; (IV) completed standardized SCIT treatment for at least 3 years and received regular follow-up; and (V) did not receive any immunotherapy. The exclusion criteria were as follows: (I) patients who did not cooperate or were lost to follow-up; (II) individuals with uncontrolled immune diseases, cardiovascular diseases or other serious diseases such as malignant tumors; (III) patients with severe uncontrollable asthma; (IV) and individuals currently taking β-blockers.

Children who were only sensitive to Der p were allocated to the monosensitization group (n=22), and the children who were sensitized to Der p and other coexisting inhaled/ingestive allergens were allocated to the polysensitized group (n=24). The data were analyzed at five different time points: baseline (before SCIT), at the end of SCIT, at 7 years after SCIT (7-y FU, n=46), at 10 years after SCIT (10-y FU, n=32), and at 15 years after SCIT (15-y FU, n=23) (*Figure 1*).

Immunotherapy

Patients received SCIT with standardized extracts of Der p (Alutard SQ, ALK Company, Hørsholm, Denmark). The treatment protocol comprises two distinct phases: dose escalation and maintenance dosage. In the initial phase of

Table 1 Baseline clinical characteristics of children with AA (N=46)

Characteristics	Value
Age (years), mean (SD)	7.35 (2.45)
Female, n (%)	15 (32.6)
Food allergies, n (%)	16 (34.8)
Drug hypersensitivity, n (%)	37 (80.4)
Allergy history, n (%)	26 (56.5)
Smoking history, n (%)	23 (50.0)
Disease duration (years), mean (SD)	3.29 (2.56)
BMI (kg/m^2), mean (SD)	15.83 (4.18)
Monosensitized, n (%)	22 (47.8)

AA, allergic asthma; BMI, body mass index; SD, standard deviation.

treatment, injections are typically administered once a week at four different concentrations in ascending order. This initial phase usually spans a duration of 15 weeks. During the maintenance phase of treatment, a concentration of 100,000 SQ-U/mL was subsequently employed. Following the initial phase, there is a gradual increase in the injection interval, with the final dose being given at intervals ranging from 4–8 weeks.

Clinical efficacy assessment

ASS and RSS

Overall symptoms of allergic rhinitis were assessed via four RSSs: nasal congestion, nasal itchiness, sneezing, and runny nose. ASS was collected to assess the overall symptoms of AA: wheezing, dyspnea, and cough. These symptoms were evaluated via a "4-point scale": 0 = no symptoms; 1 = mild symptoms; 2 = moderate symptoms; 3 = severe symptoms. The total score ranges from 0 to 12, with higher scores indicating greater severity.

Total symptom score (TSS): ASS + RSS (19).

VAS

The participants were asked to report the severity of their symptoms on a 10-cm line ranging from 0–10 cm, with 0 representing no asthma/rhinitis symptoms and 10 representing an extreme degree of asthma/rhinitis symptoms. No symptoms is scored as 0 points; mild symptoms are indicated by a score of 4 points or below; moderate symptoms are indicated by a score of 4–6 points; severe symptoms are indicated by scores from 6–10 points (20).

PAQLQ

The PAQLQ evaluated three domains that may be severely affected by asthma (activity, symptoms, emotions). Each domain is evaluated on a scale of 1–7, with 1 and 7 indicating the worst quality of life and best quality of life, respectively. Higher scores indicate better quality of life (21).

ACQ

Scores on the ACQ range from 0 to 6, with higher scores associated with less satisfactory symptom control. Scores ranging from 0–0.75 indicate ideal asthma control; scores ranging from 0.75–1.5 indicate the gray area; and scores >1.5 indicate nonideal asthma control (22).

Statistical analyses

All the data were analyzed via SPSS statistical software version 25.0 (SPSS Inc., Chicago, IL, USA). The categorical data were expressed as the number of cases (%). Continuous data conforming to a normal distribution were expressed as the mean ± standard deviation (SD) and were analyzed via the *t*-test. Continuous data that did not follow a normal distribution were expressed as medians and interquartile ranges and were compared using the Wilcoxon signed rank sum test. Statistical significance was set at $P<0.05$.

Results

Population characteristics

A total of 60 participants were initially recruited for the study, but ultimately, fourteen children were excluded based on exclusion criteria. Ultimately, 46 children (31 males and 15 females) were included in the study. The mean age of the participants was 7.35±2.45 years, and their average disease duration was 3.29±2.56 years. Among these participants, a significant proportion had a history of allergies: drug allergies were reported by 37 individuals (80.4%), food allergies were reported by 16 individuals (34.8%), and secondhand smoke exposure was reported by 23 individuals (50%). Furthermore, a positive familial allergic background was observed in 26 individuals (56.5%). Dust mite allergy was found exclusively in 24 individuals (52.2%). Notably, multiple types of allergic reactions occurred in 22 participants (47.8%) (*Table 1*).

Long-term efficacy assessment

The results demonstrated that at the 7-y FU, 10-y FU, and

Table 2 Follow-up outcomes of children with AA after SCIT

Questionnaires	Baseline (n=46)	Completion of SCIT (n=46)	7-y FU (n=46)	10-y FU (n=32)	15-y FU (n=23)
ASS	2.39±1.64	0.61±0.68*	0.22±0.69*	0.28±0.99*	0.26±0.75*
RSS	5.24±2.85	1.78±1.01*	1.20±1.11*	0.97±1.12*	1.04±1.29*
TSS	7.63±4.04	2.39±1.42*	1.41±1.53*	1.25±1.61*	1.30±1.72*
VAS	4.15±1.89	1.04±1.10*	0.83±1.04*	0.88±1.43*	0.78±1.41*
PAQLQ	130.83±6.42	139.00±3.72*	145.30±2.69*	145.47±3.13*	145.52±3.29*
ACQ	0.46±0.39	0.07±0.11*	0.02±0.09*	0.03±0.07*	0.02±0.07*

Data are presented as the mean ± standard deviation. *, P<0.001 compared with baseline. AA, allergic asthma; ACQ, Asthma Control Questionnaire; ASS, asthma symptom score; FU, follow-up; PAQLQ, Pediatric Asthma Quality of Life Questionnaire; RSS, rhinitis symptom score; SCIT, subcutaneous immunotherapy; TSS, total symptom score (ASS + RSS); VAS, visual analog scale.

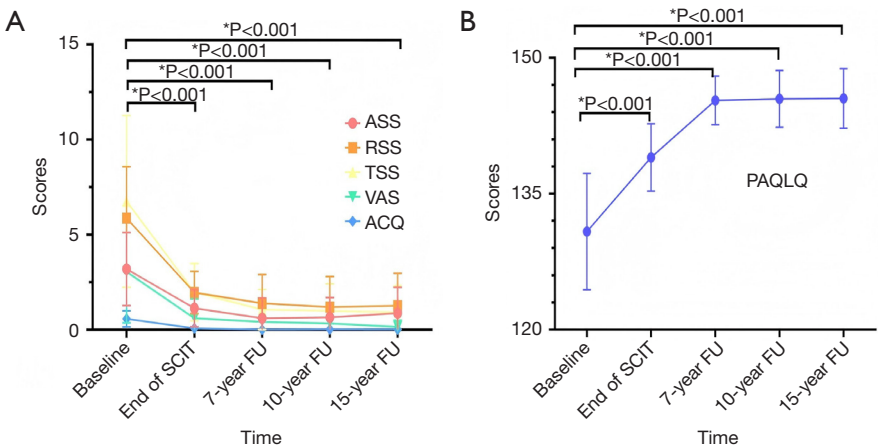

Figure 2 Changes in SCIT indexes at different follow-up times. (A) The comparison of ASS, RSS, TSS, VAS, and ACQ from baseline at the end of SCIT, at the end of 7 years, at the end of 10 years, and at the end of 15 years, respectively. (B) The comparison of PAQLQ from baseline at the end of SCIT, at the end of 7 years, at the end of 10 years, and at the end of 15 years. ACQ, Asthma Control Questionnaire; ASS, asthma symptom score; FU, follow-up; PAQLQ, Pediatric Asthma Quality of Life Questionnaire; RSS, rhinitis symptom score; SCIT, subcutaneous immunotherapy; TSS, total symptom score (ASS + RSS); VAS, visual analog scale.

15-y FU, there were significant decreases in the ASS, RSS, TSS, VAS and ACQ among patients compared with baseline values (P<0.001). Additionally, there was a significant increase in the PAQLQ at these time points (P<0.001). Furthermore, significantly lower ASS, RSS, TSS, VAS, and ACQ and significantly higher PAQLQ were also observed at the end of SCIT than at baseline (P<0.001) (*Table 2*, *Figure 2*).

Comparison of long-term efficacy between monosensitized and polysensitized allergic children

The children with AA were further categorized into a monosensitization group and a polysensitization group. The median age of patients in the monosensitization group was 6.91 (2.14) years, and that in the polysensitization group was 7.75 (2.69) years. There were no significant differences in baseline age or sex between the two groups. The clinical characteristics and long-term efficacy of SCIT were subsequently compared between these two groups. There were no significant differences in ASS, RSS, TSS, VAS, ACQ or PAQLQ between the two groups prior to treatment, at the completion of SCIT, or at any of the follow-up assessments (P>0.05). Furthermore, a comparison of scores within each group before and after SCIT revealed that children in both the monosensitization and polysensitization groups exhibited statistically significant reductions in ASS, RSS, TSS, VAS and ACQ at various time points following treatment (at the completion of SCIT as

well as at the 7-y FU, 10-y FU, and 15-y FU), whereas the PAQLQ significantly increased (P<0.001) (*Table 3*, *Figure 3*).

Discussion

AIT is currently the only treatment method that can alter the natural course of AA. The clinical application of this therapy has been widely recognized. The most classic and commonly used method of AIT administration is SCIT. However, despite multiple randomized controlled trials and meta-analyses indicating that SCIT can reduce airway hyperresponsiveness symptoms, improve quality of life, enhance lung function, and decrease medication usage in children with dust mite-induced AA after a full course of treatment, long-term efficacy studies for SCIT are lacking because of its lengthy duration and high difficulty level (12,23). Currently, there are few research reports with high levels of evidence-based medicine, especially in pediatric populations, and the longest follow-up time after SCIT treatment at home and abroad is 10 years (24-26). This study analyzed the differences in scores before and after SCIT in children with AA. The results revealed that patients experienced significant improvement in allergic clinical symptoms after receiving SCIT, and these beneficial effects could be sustained for up to 10–15 years after the discontinuation of treatment. In addition, based on our current small study, we also found that the average age of the 15-y FU population was 7.27±2.62 years, which may lead to inferences suggesting that the earlier immunotherapy is used, the better the effect may be. Of course, this is only an extrapolation based on current research, and the sample size needs to be increased to confirm this conclusion. Cools *et al.* conducted a retrospective study involving 52 asthmatic patients with dust mite allergies who received SCIT during childhood, while the control group received only conventional drug therapy without SCIT. In the ninth year after discontinuation of treatment, both groups were reassessed for clinical manifestations (27). The risk of frequent asthma symptoms was three times greater in the control group than in the SCIT-treated group, and the use of anti-asthma medication was also more common in the control group, although these differences were not statistically significant. Eifan *et al.* Also demonstrated that AA patients who underwent three years of SCIT treatment experienced improvements in asthma, rhinitis, and conjunctivitis symptoms; reduced medication usage frequency; and a decreased frequency of acute attacks (28). The therapeutic effect could be maintained for up to 10 years. These studies have demonstrated that SCIT has shown good clinical results in both the immediate term (within 1 year of the end of treatment) and the long term (nearly 10 years after the end of treatment). Empirical clinical data has shown that polysensitization is highly prevalent among pediatric patients. More than three-quarters of children with asthma demonstrate sensitivity to multiple allergens (26). Among these individuals, polysensitization is particularly common in those with AA, indicating their reactivity toward numerous allergens. This finding underscores the intricate and heterogeneous nature of allergic reactions within this population (7,29,30). Within this study, among the 23 children who ultimately completed follow-up, 10 belonged to the polysensitized group. Of these polysensitized children, 4 were mixed-sensitized (including both perennial and seasonal allergens), and 6 were sensitized solely to perennial allergens. An ongoing question is the efficacy of single-AIT in patients who are polysensitized. Most previous studies examining SCIT have explored its efficacy and safety in AA patients with monosensitivity (28,31). AIT has been used for many years, but there is limited research on its effectiveness in patients with multiple allergies, with a primary focus on short-term efficacy. Long-term efficacy data for individuals with multiple allergies are relatively scarce.

In our study, by comparing the efficacy and safety of SCIT between mono- and polysensitized AA children, we observed that the ASS, RSS, TSS, VAS, PAQLQ, and ACQ of polysensitized AA children after 3 years of treatment significantly improved from baseline at different follow-up times, even after 10–15 years of treatment. Furthermore, we also found no significant difference in long-term outcomes between monosensitized and polysensitized children with AA who received SCIT, suggesting that the clinical efficacy of SCIT in children with polysensitized AA is almost the same as that of children with monosensitized AA. These patients can benefit from SCIT treatment, and these benefits continue to persist for 10–15 years after discontinuation. These results were consistent with Zhang *et al.*'s results (32). They compared the efficacy of SCIT in monosensitized and polysensitized AA children and reported that the scores in the polysensitization group were almost the same as those in the monosensitization group. Many studies have confirmed that there is no significant difference in clinical efficacy between polysensitized and monosensitized patients with SCIT, and good efficacy can be achieved in both groups (33-35).

In contrast, regarding the selection of desensitizing medications for patients with multiple allergies, the

Table 3 Comparison of clinical characteristics and efficacy between the two groups

Characteristics	Monosensitization	Polysensitization	P value
Demographic			
Age (years)	6.91 (2.14)	7.75 (2.69)	0.16
Female	7 (36.4%)	8 (29.2%)	0.17
Endpoint			
ASS at baseline	2.77 (1.99)	2.04 (1.16)	0.07
ASS at completion of SCIT	0.68 (0.65)*	0.54 (0.72)*	0.41
ASS at the 7-y FU	0.14 (0.47)*	0.29 (0.86)*	0.46
ASS at the 10-y FU	0.14 (0.53)*	0.39 (1.24)*	0.66
ASS at the 15-y FU	0.23 (0.59)*	0.30 (0.95)*	0.66
RSS at baseline	5.50 (2.82)	5.00 (2.92)	0.17
RSS at completion of SCIT	1.59 (1.01)*	1.96 (1.00)*	0.15
RSS at the 7-y FU	1.27 (1.08)*	1.13 (1.15)*	0.37
RSS at the 10-y FU	1.07 (1.27)*	0.89 (1.02)*	0.59
RSS at the 15-y FU	1.23 (1.54)*	0.80 (0.92)*	0.10
TSS at baseline	8.27 (4.37)	7.04 (3.71)	0.10
TSS at completion of SCIT	2.27 (1.42)*	2.50 (1.44)*	0.60
TSS at the 7-y FU	1.41 (1.26)*	1.42 (1.77)*	0.94
TSS at the 10-y FU	1.21 (1.47)*	1.28 (1.74)*	0.83
TSS at the 15-y FU	1.46 (1.71)*	1.10 (1.79)*	0.16
VAS at baseline	4.27 (1.88)	4.04 (1.92)	0.42
VAS at completion of SCIT	1.05 (1.09)*	1.04 (1.12)*	0.74
VAS at the 7-y FU	0.91 (1.01)*	0.75 (1.07)*	0.22
VAS at the 10-y FU	0.93 (1.59)*	0.83 (1.34)*	0.95
VAS at the 15-y FU	0.85 (1.52)*	0.70 (1.34)*	0.18
PAQLQ at baseline	130.41 (7.35)	131.21 (5.57)	0.58
PAQLQ at completion of SCIT	139.77 (3.89)*	138.29 (3.49)*	0.31
PAQLQ at the 7-y FU	145.41 (1.92)*	145.21 (3.28)*	0.81
PAQLQ at the 10-y FU	145.86 (2.28)*	135.17 (3.99)*	0.75
PAQLQ at the 15-y FU	145.54 (2.99)*	145.50 (3.81)*	0.66
ACQ at baseline	0.51 (0.45)*	0.41 (0.33)	0.31
ACQ at completion of SCIT	0.07 (0.11)*	0.07 (0.11)*	0.90
ACQ at the 7-y FU	0.02 (0.92)*	0.02 (0.08)*	>0.99
ACQ at the 10-y FU	0.03 (0.08)*	0.02 (0.07)*	0.79
ACQ at the 15-y FU	0.02 (0.05)*	0.03 (0.09)*	0.66

Data are presented as the mean (standard deviation), unless otherwise indicated. *, P<0.001 compared with baseline. There was no significant difference in long-term outcomes between monosensitized and polysensitized children with AA who received SCIT (P>0.05). AA, allergic asthma; ACQ, Asthma Control Questionnaire; ASS, asthma symptom score; FU, follow-up; PAQLQ, Pediatric Asthma Quality of Life Questionnaire; RSS, rhinitis symptom score; SCIT, subcutaneous immunotherapy; TSS, total symptom score (ASS + RSS); VAS, visual analog scale.

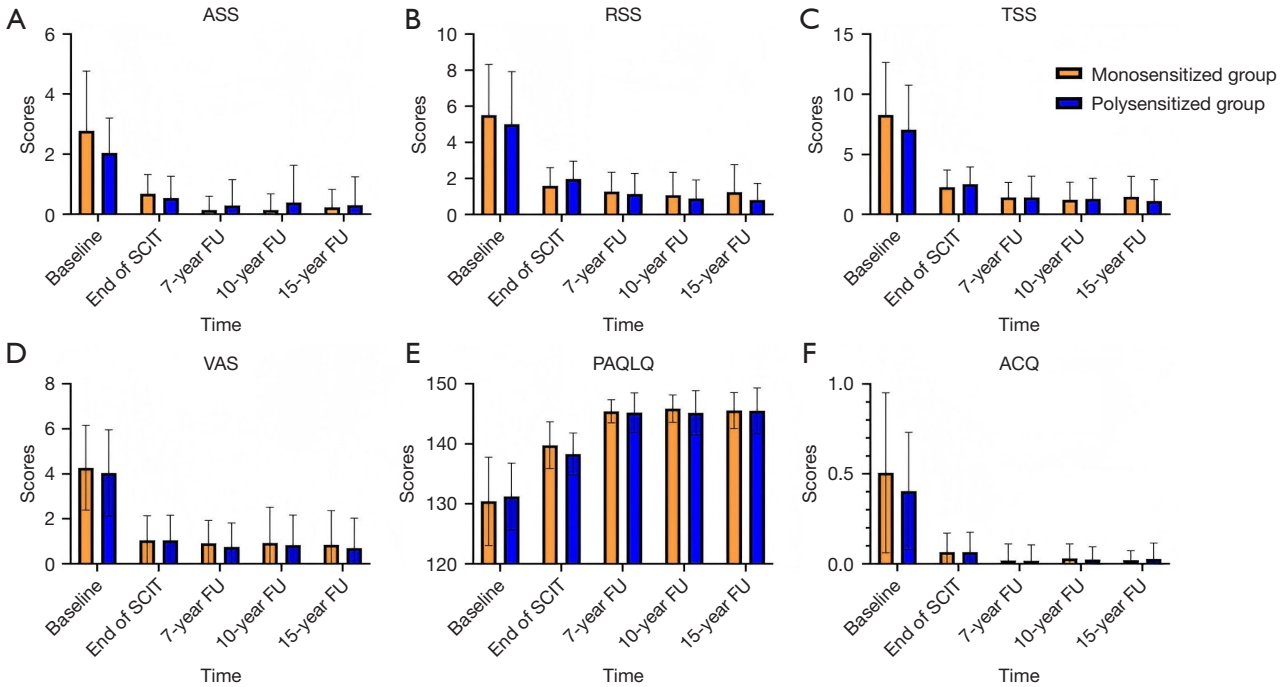

Figure 3 There was no difference in efficacy between the monosensitized and polysensitized groups. (A-F) The comparison of ASS, RSS, TSS, VAS, PAQLQ, and ACQ scores between the single sensitization group and the multiple sensitization group at baseline and at 7 years, 10 years, and 15 years after the end of SCIT. ACQ, Asthma Control Questionnaire; ASS, asthma symptom score; FU, follow-up; PAQLQ, Pediatric Asthma Quality of Life Questionnaire; RSS, rhinitis symptom score; SCIT, subcutaneous immunotherapy; TSS, total symptom score (ASS + RSS); VAS, visual analog scale.

American Allergy Association tends to opt for extracts of two primary allergens as desensitizing agents, whereas the European Allergy Association leans toward using extracts of only one allergen, resulting in inconsistent statements. Presently, China utilizes a single dust mite preparation produced by a Danish company for SCIT. We can infer from the results of our study that polysensitized participants may benefit from SLIT as much as monosensitized participants and therefore conclude that sensitization status may not be related to the clinical efficacy of SCIT.

There are several limitations to the present study. First, facility workflow constraints hindered participant recruitment targets, while significant loss to follow-up occurred due to updated contact information and poor compliance. This reduced the statistical power, potentially obscuring true intergroup differences and compromising result reliability. Second, despite patient education on allergen avoidance, complete elimination of environmental allergen exposure could not be guaranteed, which may confound symptom assessment and experimental outcomes. Third, the small cohort completing the 15-year follow-up (n=23) limited subgroup analysis power. For instance, the gender analysis (14 males *vs.* 9 females) showed no statistical significance, reducing confidence in subgroup inferences. Fourth, the lack of a placebo control group precluded longitudinal comparison of symptom score changes.

Conclusions

In general, these results suggest that polysensitized participants may benefit from HDM SCIT as much as monosensitized participants. Sustained clinical efficacy is maintained 15 years after the completion of HDM SCIT, and based on the current cohort size and in the absence of immunological correlates, this study/analysis did not demonstrate a statistically significant association between sensitization status and SCIT efficacy outcomes.

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Footnote

Reporting Checklist: The authors have completed the STROBE reporting checklist. Available at https://tp.amegroups.com/article/view/10.21037/tp-2025-313/rc

Data Sharing Statement: Available at https://tp.amegroups.com/article/view/10.21037/tp-2025-313/dss

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Conflicts of Interest: All authors have completed the ICMJE uniform disclosure form (available at https://tp.amegroups.com/article/view/10.21037/tp-2025-313/coif). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved. The study was conducted in accordance with the Declaration of Helsinki and its subsequent amendments. The study was approved by the Central Ethics Committee of Shanghai Children's Hospital (No. 2020R140-F01) and informed consent was taken from all children's legal guardians.

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