

THE INFLUENCE OF SUBLINGUAL SPECIFIC IMMUNOTHERAPY ON THE DYNAMICS OF SENSITIZATION INDICATORS IN POLLEN-INDUCED BRONCHIAL ASTHMA

¹Nazarov Azadbek Ahmedovich, ²Mirzakarimova Farida Rustamovna, ³Kaleda Svetlana Petrovna, ⁴Polikarpova Natalia Vladimirovna

^{1,2,3,4}Tashkent Pediatric Medical Institute

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Abstract. *In recent years, bronchial asthma (BA) has been attracting increasing attention from practicing physicians and researchers. This can be explained by a clear increase in the prevalence of BA among all age groups of the population, significant changes in clinical manifestations with more severe progression, and still inadequate effectiveness of the treatment measures being used [1,2,3,4,6]. Currently, the problem of the pathogenetic basis of pollinosis has been extensively investigated, with a leading role attributed to IgE-mediated allergic reactions [5,8,9]. Theoretical prerequisites for allergen-specific immunotherapy (ASIT) have been established, and its effectiveness has been demonstrated in the treatment of pollinosis [4,5,6,7].*

Keywords: *allergen-specific immunotherapy (SLIT), rhinoconjunctivitis, immunoassay analyzer.*

ASIT (allergen-specific immunotherapy) has fundamental advantages over all other methods of allergy treatment as it intervenes in the pathogenesis of the disease and regulates all pathogenetic links of the allergic process, thereby alleviating disease symptoms [6,7,8,9].

A regional feature of respiratory allergies is the predominant sensitization of the body to the pollen of ragweed, mugwort, but in recent years, the number of individuals with increased sensitivity to multiple types of allergens from different classes has increased. In patients with atopic bronchial asthma (BA), the addition of another type of sensitization can lead to the development of a severe combined form of BA, requiring special diagnostic and therapeutic approaches [3,5,7].

Inflammatory changes in pollen-induced bronchial asthma (BA) are not limited to the central airways but can also be found in the upper and distal parts of the respiratory tract, as well as in the nasal sinuses. This indicates that BA can be considered a systemic disease. In such cases, it requires a systemic approach to treatment. Among all the available treatment methods for pollen-induced BA, sublingual allergen-specific immunotherapy (SLIT) stands out as a clear example of a systemic approach.

Research and Methods

For this purpose, 42 patients aged 5 to 17 years (16 boys and 26 girls) who had no contraindications for sublingual allergen-specific immunotherapy (SLIT) in addition to their baseline therapy (beclomethasone 200 mcg per inhalation, 3 times a day) were examined.

The effectiveness of sublingual ASIT was evaluated based on clinical assessments of symptom intensity and medication requirements. Skin prick tests and endonasal tests were performed using standard methods [6,7] with aqueous-salt extracts of allergens. Pulmonary function tests (PFT) were conducted using computer spirometry before treatment and monthly throughout the course of treatment for one year. The results of the PFT were analyzed based on

the flow-volume curve during the course of ASIT. The levels of total IgE were determined using an MRS8 immunoassay analyzer and the allergen component "Alkor BIO" (Russia).

Results and discussions

The results of the conducted study showed that 37.5% of patients experienced peak clinical manifestations of bronchial asthma (BA) during a specific season: 13.4% in spring, 20.8% in autumn, and 3.3% in summer. The characteristics of clinical manifestations in seasonal BA are presented in Table 1. From the presented results, it can be observed that patients with autumnal-type BA exhibited more pronounced symptoms of rhinoconjunctivitis, a higher proportion of respiratory symptoms such as asthma attacks (98%) and cough (92%), and a higher percentage of clinical manifestations compared to the mild exacerbation type of BA (52% vs. 98%).

For autumnal-type bronchial asthma (BA) compared to other seasonal manifestations, longer durations of exacerbation and prolonged periods of allergic and topical therapy were observed.

Table 1

The clinical semiotics of the indicators of seasonal manifestations of bronchial asthma (BA) in percentage are presented in the following table:

№	Indicator	The peaks of seasonal manifestations		
		Spring P - 16	Summer P-8	Autumn P-18
1	Nasal congestion	84%	72%	95%
2	Sneezing	92%	84%	92%
3	Conjunctivitis	95%	75%	96%
4	Coughing	46%	44%	92%
5	Shortness of breath	52%	52%	98%
6	Duration of exacerbation (days)	22%	56%	76%
7	Duration of non-sedating antiallergic medication intake (days)	36%	42%	35%
8	Duration of topical therapy (days)	42	34	60
9	Total IgE level (mg/ml)	251±3,2	152±2,1	560±3,5

Observations show that pollen-induced asthma attacks occur in the morning (from 8 to 11 am), which coincides with the time of peak pollen release by plants. The duration of exacerbation during the initial period of flowering of allergenic plants (February-March) is not significant, and the symptoms are mild.

The most dangerous and prolonged period was the second and third periods of plant flowering, which lasted from mid-April to the second decade of November (on average, from 120 to 240 late-summer/autumn days). This period was characterized by the flowering of complex-flowered, ragweed, and grass plants.

The assessment of clinical-allergic parameters and the effectiveness of bronchial asthma treatment demonstrated high efficacy of sublingual allergen-specific immunotherapy (SLIT). Please refer to Table 2 for further details.

In patients with bronchial asthma (BA) who underwent sublingual allergen-specific immunotherapy (SLIT), a follow-up assessment revealed a reduction in the frequency and severity of nasal symptoms by up to 56.7% and conjunctival symptoms by up to 33.3%. The analysis of the study indicated that in the subsequent season, there was a decrease in the number of episodes of shortness of breath and a reduction in their average duration.

Table 2

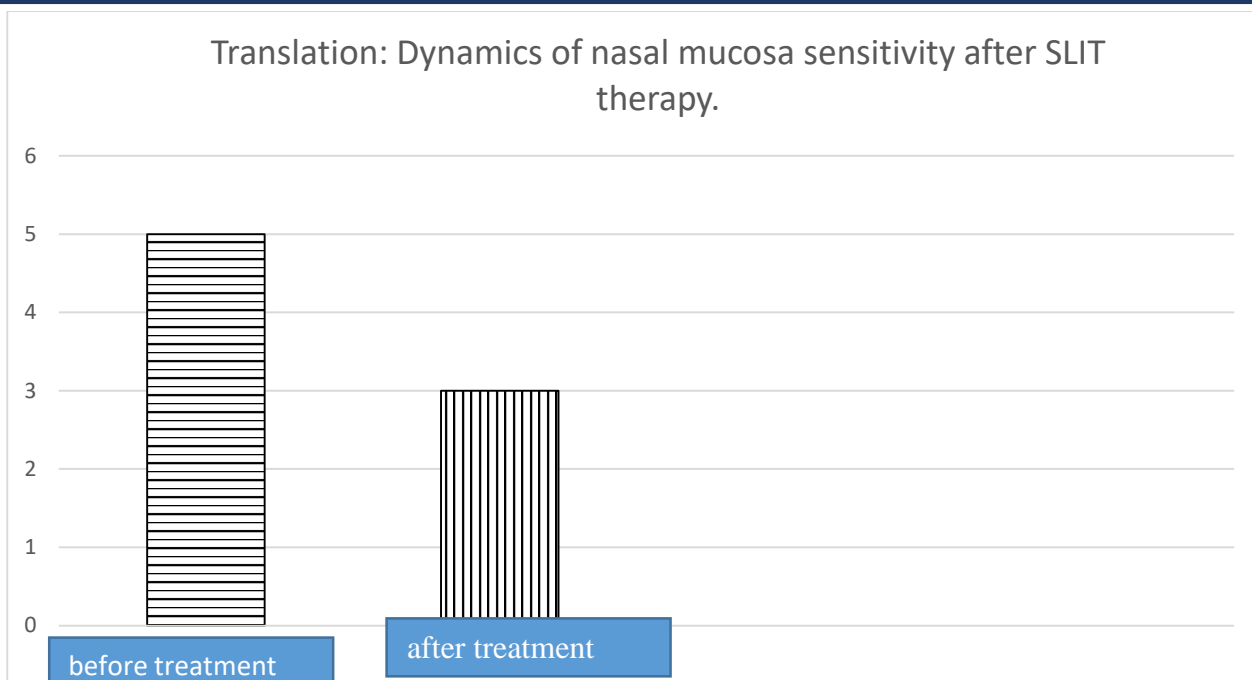
A comparative assessment of the effectiveness of sublingual allergen-specific immunotherapy (SLIT) in bronchial asthma (BA) in percentage is presented below:

№	Criteria	SLIT	
		Before treatment	After treatment
1	Frequency of clinical manifestations, %	67,6	38,1
2	Severity of nasal symptoms, scores	2,93	1,1
3	Coughing, %	27,6	10,3
4	Shortness of breath, %	10,3	6,9
5	Duration of antihistamine therapy (days)	52,1	15,4
6	Duration of topical steroid therapy (days)	49,9	14,4

The results of the conducted study have demonstrated the rationale for the use of specific immunotherapy in patients with bronchial asthma (BA), which leads to a reduction in the average number of clinically significant allergens by 30.2%.

After completing a course of therapy with sublingual allergen-specific immunotherapy (SLIT) with the respective allergens, positive skin prick tests (++++, +++) became negative in 18.8% of cases after one year.

After assessing the dynamics of the desensitizing effect with sublingual allergen-specific immunotherapy (SLIT), it was observed that the nasal mucosa did not react to the allergen in 25% of cases after the first course of treatment with non-infectious allergens. Subsequent courses of treatment further diminished the sensitivity of the nasal mucosa. Picture 1.



Analyzing the data from the pulmonary function tests (PFT), it is worth noting that there was a high baseline level of respiratory function parameters, with the forced expiratory volume (FEV) showing a decrease of 91.6% (see Table #3). This can be attributed to the fact that the sublingual allergen-specific immunotherapy (SLIT) was administered alongside the baseline therapy using the topical steroid budesonide in moderate daily doses. During the course of SLIT, the PFT parameters showed stability and had a tendency to gradually and slowly increase towards the end of the treatment. For example, the FEV1 value increased by 11.1% ($P < 0.005$).

Table 3

The dynamics of pulmonary function test (PFT) parameters during sublingual allergen-specific immunotherapy (SLIT) are as follows:

Pulmonary function test (PFT) parameters	Before treatment	After treatment
FVC	106,8+4,7	112,2+2,7**
FEV1	91,6+7,0	100,0+7,3**
FEF75	77,7+10,1	86,8+11,1**
FEF50	63,1+9,4	82,4+10,6**
FEF25	56,2+9,0	18,4+9,1**

Note: * $p < 0.05$, ** $p < 0.001$ compared to the baseline data.

It should be noted that throughout the entire observation period, neither systemic nor local reactions were observed during the treatment.

Conclusion:

Thus, sublingual allergen-specific immunotherapy (SLIT), as demonstrated in our conducted study, has shown a high level of safety by reducing both general sensitization and local reactions. In children with bronchial asthma (BA), none of the patients developed local or systemic adverse reactions. SLIT can be recommended as a convenient and safe method for the pathogenetic treatment of respiratory atopic diseases in children.

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