Original paper

Quality of life in adolescent and adult patients with persistent allergic rhinitis after one year of subcutaneous immunotherapy with a modified mite extract

Vanesa García-Paz[1], Laura Romero-Sánchez[2], Iván Carballeira-Anca[1], Carolina Gómez-Fariñas[3], Andrea Otero-Alonso[4], Soledad Sánchez-Sánchez[1], María González-Rivas[4], Leticia Vila-Sexto[5]

[1]Allergy Department, Complexo Hospitalario Universitario de Ferrol, A Coruña, Spain
[2]Allergy Department, Complexo Hospitalario Universitario de Vigo, Pontevedra, Spain
[3]Allergy Department, Complexo Hospitalario Universitario de A Coruña, A Coruña, Spain
[4]Allergy Department, Complexo Hospitalario Universitario de Santiago de Compostela, A Coruña, Spain
[5]Paediatric Allergy Unit, Department of Paediatrics, Complexo Hospitalario Universitario A Coruña, A Coruña, Spain

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Abstract

Introduction: Allergic rhinoconjunctivitis (AR) is an IgE-mediated inflammation of nasal and ocular mucosa after environmental allergen exposure, mainly by house dust mites (HDM). AR affects more than one third of the population worldwide and it is associated with loss of quality of life (QoL).
Aim: To analyse the improvement in the QoL in 50 patients with moderate-persistent AR due to house HDM before and after receiving 1 year of subcutaneous specific aeroallergen immunotherapy treatment (SAIT).
Material and methods: A prospective observational study was performed based on clinical practice in 50 patients with moderate-severe persistent AR due to HDM and candidates to SAIT. Forty-one patients completed the study. Patients were evaluated with the ESPRINT short-version QoL questionnaire, a score of medication use and visual analogue scale (VAS) symptom score, prior to and 12 months after SAIT.
Results: Forty-one patients (25 women, mean age 26.9 years). Mean ESPRINT values prior to the start SAIT was 3.06 (moderate-severe) and 1 year after starting subcutaneous SAIT the mean value dropped in all patients to 0.88 (mild). The VAS score symptom dropped from 8.26 to 3.68. 97.56% of patients used 3 or more drugs (oral antihistamine, ophthalmic/intranasal antihistamine, intranasal corticosteroid and/or oral antileukotrienes) prior to starting SAIT, and 1 year after it, 58.53% used one on-demand medication to control symptoms, oral antihistamine or nasal spray, and not daily use.
Conclusions: Subcutaneous SAIT seems to be a valid treatment in our patients with moderate-persistent AR due to HDM, since it reduces the ESPRINT score, VAS score and the use of medication. An improvement in the quality of life and satisfaction was observed by the patients themselves.

Key words: quality of life, allergic rhinoconjunctivitis, rhinitis, ESPRINT, VAS, children, adolescent, adult, treatment, immunotherapy.

Introduction

Allergic rhinoconjunctivitis (AR) is an IgE-mediated inflammation of the nasal and ocular mucosa in response to environmental allergen exposure [1]. AR is the most frequent pathology in allergology and the first reason for consultation [2]. It is one of the most prevalent allergic diseases, affecting more than one third of the population worldwide [3]. AR is also associated with loss of quality of life (QoL) [3, 4] and with considerable loss of productivity and impaired school performance [5]. AR current treatment is divided into medical treatment (antihistamines, intranasal corticosteroids, intranasal antihistamines, antileukotrienes, antihistamine eye drops) and specific aeroallergen immunotherapy treatment (SAIT), both subcutaneous or sublingual administration [4].

Aim

The aim of the present study was to analyse the improvement in the QoL in 50 patients with moderate-

Address for correspondence: Vanesa García Paz, Department of Allergy, Hospital Arquitecto Marcide, Av. da Residencia, S/N, 15405 Ferrol, A Coruña, Spain, e-mail: vanesa.garcia.paz@sergas.es
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persistent AR due to house dust mites (HDM) before and after receiving 1 year of SAIT.

Material and methods

Design

We conducted a 1-year-observational and prospective study in HDM-allergic patients at the Allergology Department of the University Hospital of Ferrol (Galicia, Spain) between September 2020 and September 2021. The Public Health System in Ferrol covers 182,751 people and serves mainly rural population. The temperature ranges between 12 and 21ºC and the climate is mainly rainy, similar to the northwest of Spain.

Fifty patients were included but 41/50 completed the study. Nine patients did not complete the study due to the fact that they did not finally buy the allergy vaccine for financial reasons. Patients had been referred either from primary care and other specialists for evaluation of respiratory symptoms. They were selected consecutively from the Allergology consultations, after being diagnosed with a moderate-persistent AR due to sensitization to HDM according to the ARIA classification [6]. All patients were sensitized to mites and had no sensitizations to other aeroallergens. The patients were included for immunotherapy since they did not obtain good control of their rhinitis with environmental mite control measures and medical treatment, all were diagnosed with moderate-severe persistent rhinitis due to mite allergy lasting more than 1 year. In the 12-month follow-up, the patients had their usual check-up visits according to usual clinical practice to check the degree of improvement with immunotherapy and the use of medication.

Patients with asthma, smokers, nasal polyposis or other diseases that could negatively affect quality of life were excluded. The patients included were adolescent or young adult patients with no personal history of interest or toxic habits whose only illness was moderate-severe persistent allergic rhinitis.

Study procedures

The diagnosis was made using skin prick tests with commercial extracts (ALK Abelló) of aeroallergens from our environment. (*Dermatophagoides pteronyssinus*, *Lepidoglyphus destructor*, *Tyrophagus putrescentiae*, *Chortoglyphus arcuatus, Alternaria alternata*, *Aspergillus fumigatus, Phleum pratense, Cupressus arizonica, Cynodon dactylon, Plantago lanceolata, Parietaria judaica, Artemisia vulgaris, Betula alba, Olea europaea, Fraxinus excelsior, Quercus robur, Platanus acerifolia, Profilin, Polcalcin, LTP, Latex, Alt a-1, prawn, tropomyosin, cat and dog*). Histamine was used as a positive control and saline as a negative control.

Total serum IgE was measured using latex-enhanced nephelometry in a BN-II System analyser (Siemens) and sIgE HDM allergen (*Dermatophagoides pteronyssinus*, Der p 1, Der p 2 and *Lepidoglyphus destructor*) was measured using the ImmunoCAP-250 system (Thermo Fisher Scientific) in all patients for further confirmation of their mite allergy. Following the manufacturer's instructions, sIgE levels ≥ 0.1 kUA/l were deemed positive, although we have considered the classic level higher than 0.34 kU/l positive. To be diagnosed as allergic to mites, all patients had to have a clinical correlation between their symptoms and their sensitization. All patients underwent forced spirometry with a bronchodilator test to rule out asthma. Patients with bronchial asthma were excluded. The diagnosis of asthma was made according to the GEMA 5.0 guideline [7].

Subcutaneous SAIT with a polymerized extract of HDM was prescribed in all patients according to standard clinical practice. To be a candidate for SAIT, the patient must present IgE-mediated respiratory symptoms, which are considered clinically relevant and responsible for the patient's symptoms, and do not respond sufficiently to environmental avoidance measures and symptomatic treatment. The immunotherapy extracts used were scheduled according to the patient's sensitization, the commercial brands used were Leti (Depigoid DUO 100% *Dermatophagoides pteronyssinus* + *Lepidoglyphus destructor* or Depigoid Forte 100% *Dermatophagoides pteronyssinus*), Roxall (Allergovac Poliplus 100% *Dermatophagoides pteronyssinus* + *Lepidoglyphus destructor*), Stallergenes (Stalgoid 100% *Dermatophagoides pteronyssinus* + *Lepidoglyphus destructor*, Diater (Polymerized Diater 100% *Dermatophagoides pteronyssinus* or *Dermatophagoides pteronyssinus* + *Lepidoglyphus destructor*), Allergy Therapeutics (Acarovac Plus 100% *Dermatophagoides pteronyssinus* or *Dermatophagoides pteronyssinus* + *Lepidoglyphus destructor*) and Hal Allergy (Purethal 100% mites). The administration regimen used was an ultra-rapid regimen starting and reaching maintenance in 1 day with 0.5 ml subcutaneous extract and subsequently administration every 4 weeks, alternating the arms.

Patients were evaluated at least in two visits for symptom assessment and symptomatic treatment adjustment: before starting SAIT and 12 months after it. Between both, revisions were performed according to normal clinical practice; and each patient was evaluated by the same physician at each visit. Data were collected on symptoms, use of medication, VAS score and the ESPRINT questionnaire reduced version of 15 items in Spanish [8]. In this questionnaire, 5 spheres of the patient's QoL were evaluated: symptoms, affectation of activities of daily living, sleep, psychological affectation and how the patient assesses their general health, taking into account rhinitis and no other disorder.

After the first year of immunotherapy, 41 participating patients were asked a question about being satisfied or not with the immunotherapy, with the effects achieved in the first year.

Ethical issues

The study was approved by the Ethics Committee of University Hospital of Ferrol and was carried out according to the current Helsinki Declaration. Written informed consent was obtained from all participants.

Statistical analysis

The statistical analyses were carried out with the IBM SPSS software for Windows version 22 (SPSS, Chicago, IL, USA) and *p* was considered statistically significant with a value < 0.05.

Results

A total of 50 patients were selected but 41 patients completed the study and diagnosed with persistent-moderate AR due to HDM. The mean age was 26.95 years (range: 12–46 years), and 25/41 were female patients. Regarding HDM sensitization, we observed that 65.85% of the patients (27/41) were co-sensitized to *Dermatophagoides pteronyssinus* and *Lepidoglyphus destructor*, and 34.15% (14/41) were only monosensitized to *Dermatophagoides pteronyssinus*.

The mean score of the ESPRINT questionnaire prior to the start of SAIT was 3.06. This score shows moderate-severe rhinitis that affects the patient's QoL. The mean VAS value was 8.26 points, placing the score in high intensity on that scale (Table 1). Subcutaneous SAIT with a polymerized extract of HDM was prescribed in all patients. According to their sensitizations, 27/41 patients received a *Dermatophagoides pteronyssinus* and *Lepidoglyphus destructor* composition of SAIT, and 14/41 patients received a 100% *Dermatophagoides pteronyssinus* composition. All patients declared no adverse events during the observation period. After completing the first year of SAIT, the mean score of ESPRINT questionnaire scores dropped to 0.88, which places it in mild quality-of-life impairment and a mean value of the VAS scale of 3.68 (Table 1). There have been no differences in the response in the monosensitive compared to the dual sensitized patients in relation to VAS and ESPRINT score. There were no statistically significant differences between adolescents and adults, women and men. There was a statistically significant correlation between the pre and post VAS and ESPRINT values.

Regarding the use of medication, prior to SAIT, 97.56% of the patients needed 3 or more drugs to control symptoms and with daily or almost daily use (oral antihistamines, intranasal corticosteroids, antileukotrienes and/or antihistamine eye drops); 2.44% needed 1 or 2 drugs daily to control symptoms (oral antihistamines and/or intranasal corticosteroids). After completing the first year of SAIT, 41.47% of patients controlled their symptoms with 1 or 2 drugs daily or almost daily (oral antihistamines and/or intranasal corticosteroids) and 58.53% of patients controlled their symptoms with 1 drug or less, that is, with oral antihistamine or intranasal corticosteroid but only on-demand use (Table 1).

Regarding the satisfaction question asked of the 41 patients after completing the 1st year of immunotherapy, 97.3% of the patients responded that they were satisfied.

Table 1. Quality of life and medication use outcomes before and after 1 year of specific immunotherapy treatment

Scores (mean value)	Before immunotherapy (0 months)	After immunotherapy (12 months)
ESPRINT questionnaire	3.06 (moderate-severe AR)	0.88 (mild AR)
VAS	8.26	3.68
Score of medication use:		
≥ 3 drugs	97.56% (40/41)	0% (0/41)
1–2 drugs	2.44% (1/41)	41.47% (17/41)
< 1 drug (on-demand medication)	0	58.53% (24/41)

Discussion

AR is one of the most frequent allergic pathologies [2–4] and is associated with loss of QoL [3, 4]. The aim of this study was to evaluate the impact of 1-year-treatment with subcutaneous SAIT in moderate-severe persistent AR to HDM, related to QoL and use of medication. In the general population there is a greater prevalence of allergic rhinitis in men [9]. However, in our study, 25/41 patients were women (not statistically significant). A higher percentage of patients sensitized to both *Dermatophagoides pteronyssinus* and *Lepidoglyphus destructor* (65.9%) was observed compared to 34.1% of patients who were only sensitized to *Dermatophagoides pteronyssinus*. This reflects the high prevalence of sensitization to *Lepidoglyphus destructor* in our region (northwest of Spain), as previously reported [9], which could be closely related to the weather or specific characteristics of the region [10].

An improvement in ESPRINT and VAS questionnaire values was observed, with lower values in both scales after 1 year of subcutaneous immunotherapy treatment. The ESPRINT questionnaire was used to analyse the evolution in QoL and medication use after 1 year of SAIT. It was given to patients for self-completion, avoiding possible researcher bias. The ESPRINT questionnaire before to treatment decreased from 3.06 (corresponds to moderate-severe rhinitis) to a mean score of 0.88 (corresponds to mild rhinitis) after it. In addition, a reduction was observed in terms of the use of medication since 97.56% of the patients used 3 or more drugs to control symptoms

and 2.44% 1 or 2. After 1-year SAIT, none of them needed 3 or more drugs, 41.47% (17/41) used a daily drug and 58.53% of the patients used only antihistamines or intranasal corticoids on demand. Both facts suggest the efficacy of subcutaneous SAIT with a modified extract in AR to HDM in our patients, indicating a clinical improvement observed by the patients and a decrease in the degree of rhinitis in terms of its persistence and/or severity. These results are consistent with those previously reported by Novakova *et al.* [3]. Moreover, a satisfaction survey was also carried out in the patients after completing the first year of immunotherapy, with 97.3% of the patients who valued positively the treatment they had received with SAIT. Although the follow-up time was 12 months with SAIT, in clinical practice it usually lasts between 3 and 5 years [4]. So in our study, 1 year was sufficient to reflect an improvement of QoL and less use of medication in AR patients.

Study patients then continued their immunotherapy in accordance with standard clinical practice.

Regarding the limitations that this work may have, we emphasize that the sample is small, a larger number could vary the results and we have only included patients with moderate and severe persistent allergic rhinitis, while patients with moderate intermittent or mild persistent rhinitis were not included. And the patients have not been controlled with placebo. But, despite this, the sample shows that 1 year of immunotherapy in patients with moderate-severe persistent rhinitis due to mite allergy improves the symptoms and decreases the use of medication, and all of this is observed by the patient as well as an improvement in their quality of life.

Conclusions

Our results showed that 1 year's treatment with subcutaneous immunotherapy with a HDM extract improved the quality of life in our patients with persistent moderate AR, showing a reduction in the use of drugs for symptom control, and lower scores in the quality of life questionnaires (such as ESPRINT and VAS), which translates into clinical improvement and satisfaction observed by patients. Further studies are needed to assess the degree of clinical improvement in patients with immunotherapy and its effect on quality of life and patient satisfaction.

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Ethical approval

Not applicable.

Conflict of interest

The authors declare no conflict of interest.

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