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ORIGINAL ARTICLE

Comparison of two diagnostic techniques, skin-prick test and component resolved diagnosis in the follow-up of a cohort of paediatric patients with pollinosis. Multicentre pilot study in a highly exposed allergenic area

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Allergic respiratory disease;
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Abstract
Background: Over the last years, different works have been published about the importance of incorporating new diagnosis techniques in allergic patients such as component-resolved diagnosis (CRD). The objective of this study is to compare the evolution of allergic sensitisation profiles by means of CRD and cutaneous tests (SPT) on pollen-allergic patients.
Methods: A total of 123 patients aged between 2 and 14 years were included in an open, prospective, multicentre study. All the children had symptoms suggestive of seasonal respiratory allergic disease, with the diagnosis confirmed by cutaneous tests. Specific-IgE to major pollen-allergens (CRD) and SPT were performed at basal and after three years of follow-up.
Results: Out of 123 patients included, a total of 85 were analysed. The mean age was 8 ± 3 years. Significant changes in the allergic sensitisation profiles were observed for the most prevalent allergens (Olea and grass) but it is in grass, the most relevant allergen in terms of allergen pressure, where changes in both absolute and relative frequencies between SPT and CRD were more evident.
Conclusion: CRD seems to be an essential tool to carry out an appropriate follow-up of patients with allergic respiratory disease, as well as to decide on the immunotherapy composition that best matches the allergic sensitisation profile of patients.

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Introduction

Respiratory allergy affects an estimated 10–25% of the population and its prevalence has been permanently increasing during the last three decades.[1] The conventional allergy diagnosis is based on skin-prick tests (SPT) and the measurement of circulating specific immunoglobulin E (sIgE) is used as a complementary diagnostic tool, although both diagnostic methods detect the presence of specific IgE to a mixture of natural allergens, including some panallergens involved in cross-reactivity mechanisms. The term *sensitisation* did not necessarily imply the presence of clinical manifestations following exposure to a particular allergen.[2] Polysensitisation has been defined as sensitisation to two or more allergens. Also, polyallergy is defined as a clinically confirmed allergy to two or more allergens. Polysensitised patients do not necessarily have polyallergy, whereas all polyallergic patients will be polysensitised.[3] Therefore, in patients polysensitised to pollen it can be difficult to establish which pollen source is responsible for the respiratory symptoms. This can be especially cumbersome in patients sensitised to different allergenic pollen sources or to pollens that have similar periods of pollination in the same geographic area.

Over the last years, different works have been published about the importance of incorporating new diagnosis techniques in allergic patients such as component-resolved diagnosis (CRD). In the case of patients with allergic respiratory disease, different reviews agree on the importance of CRD in polysensitised patients with this disease to differentiate genuine sensitisers from crossed reactivity sensitisations.[4,5] With respect to immunotherapy, the European Academy of Allergy and Clinical Immunology (EAACI) recommends vaccination with the clinically relevant allergen and, in polysensitised patients, with only few allergen sources.[6]

It has been shown that the CRD allows for a more accurate allergen immunotherapy (AIT) screening, favouring the inclusion in the extract of only allergens actually responsible for respiratory symptoms, thus allowing the AIT to present a better cost-effectiveness ratio. In this respect, several recent works point out the important differences in the AIT composition established by clinical prescribers when the decision is based on skin test results or when CRD results are included in the decision process; differences that may exceed 50%.[7–9]

Nevertheless, it should be pointed out that most studies are cross-sectional. In the case of the paediatric population, there is a longitudinal study conducted in Germany[10] that includes data of patients exclusively allergic to grass pollen. Further studies conducted in the paediatric population are focused on the field of food allergy[11,12] or on the impact of this diagnostic technique regarding AIT.[13–15]

Given the limited number of longitudinal studies, conducting a study whose objective is to compare result differences has been proposed. Allergy diagnosis is performed by means of a conventional technique (SPT) and the CRD in paediatric patients allergic to pollen after three years of disease evolution.

Materials and methods

Design

This is an open, prospective, multicentre study conducted in five hospitals in the south area of Madrid, Spain, a plateau region with a continental climate and considerable levels of pollen.[2] This study was approved by the Clinical Research Ethics Committees corresponding to each site. All patients (and/or their parents/guardian) gave their written informed consent to participate.

Patients

Inclusion criteria were as follows: consecutive patients aged 2–14 diagnosed with pollen-induced allergic respiratory disease (allergic rhinitis and/or asthma)[16,17] and with positive SPT against the most relevant pollens of the area. Rhinitis was classified in accordance with ARIA guidelines,[16] criteria and allergic asthma according to the 2009 version of the GEMA (Spanish Guideline on the Management of Asthma) guideline criteria.[17] The exclusion criteria involved patients under previous immunotherapy treatment who were included in any clinical research programme or who did not consent to participate in the study. Patients were included consecutively for a four-month period, outside the pollen season.

SPTs

SPTs were performed with a commercial extract panel (ALK-Abelló, S.A., Madrid, Spain) which included the most frequent pollens in the study area: Grass, *Olea*, *Salsola*, *Cynodon*, *Platanus*, *Cupressus*, *Artemisia*, and purified profilin from the date palm. Date palm polcalcin-enriched SPT was obtained from the same extract after the removal of profilin. *Alternaria* was also included for being a very frequent co-sensitisation in pollen patients of the studied area.[2] Histamine (10 mg/ml) was used as positive control and saline solution as negative control. Any $\geq$3 mm mean wheal diameter was considered positive. The SPT result was considered clinically relevant when the symptoms matched the pertinent pollination periods.

Determination of IgE

Specific IgE (sIgE) to the different allergens was measured with an ADVIA Centaur platform assay (Bayer HealthCare Diagnostics Division), based on a reverse-sandwich assay. The tests were performed according to previously established methods.[18] sIgE to the major allergens was considered positive if values were 0.35 kU/l or higher. The allergens tested were: nPhl p 1 and nPhl p 5, nPhl p 7 (polcalcin), nOle e 1 and nOle e 9, nArt v 1, nSal k 1, nCup s 1, nPla a 1 + 2, nPho d 2 (profilin) and nAlt a 1. Pho d 2 and no other profilin were selected because the SPT of profilin used was from the date palm.

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