



ORIGINAL ARTICLE

Effectiveness of immunotherapy in children depends on place of living – A pilot study

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KEYWORDS

Immunotherapy;
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Abstract

Background: It is considered that farm areas protect young patients from allergy and asthma due to high exposure to endotoxins. Allergen immunotherapy (AIT) is the only treatment of allergy modifying the immune response with the potential to change the natural history of allergic diseases. It seems that studies evaluating the efficacy of immunotherapy in large cohorts of allergic patients living in farm areas are needed to understand the influence of environment on immune response during AIT.

Aim. To compare the clinical effectiveness of immunotherapy between children living in farm versus urban areas.

Materials and methods: This was a retrospective analysis of 87 children living in farm area ($n=42$) and city area ($n=45$), aged 8–16, who completed three years of subcutaneous immunotherapy due to allergic rhinitis/asthma. An AIT efficacy questionnaire has been designed to be filled in by the allergy specialist during a regular immunotherapy visit before and after AIT.

Results: We observed significantly higher improvement in total score among children from farm area compared to children from city area ($p < 0.001$). Between-group differences in symptoms and drug scores did not reached the level of significance. Multivariate logistic regression analysis (adjustment for the effect of gender and type of allergy) showed that living in farm areas was independently associated with significant improvement in total score after immunotherapy (OR: 10.9; 95%CI: 3.7–32.2).

Conclusion: The current analysis of the better AIT effectiveness in the farm population has shown the protective influence of environmental exposures on asthma and allergic rhinitis in our children.

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Introduction

The protective effect of farming on asthma and atopy has been shown in numerous studies consistently across many parts of the world, and the beneficial effects of childhood farm exposure likely last until adulthood.¹⁻³ It is considered that farm areas protect young patients from allergy and asthma due to high exposure to endotoxins. A recently-published study by Schuijs et al., showed that chronic exposure to endotoxin or farm dust protects mice from developing asthma.⁴ Allergen immunotherapy (AIT) is the only treatment of allergy modifying the immune response with the potential to change the natural history of allergic diseases in many atopic children. It seems that studies evaluating the efficacy of immunotherapy in large cohorts of allergic patients living in farm areas are needed in order to understand the influence of environment on immune response.

The aim of this pilot study is to compare the clinical effectiveness of immunotherapy between children living in farm versus urban areas.

Material and methods

This was a retrospective analysis of 87 children living in farm area ($n=42$) and city area ($n=45$), aged 8–16, who completed three years of subcutaneous immunotherapy (dust mites, grasses, trees) in our allergy outpatient clinic due to allergic rhinitis and/or asthma, in years 2013–2015. Before immunotherapy there were no differences in asthma/allergic rhinitis severity between study groups. Children were considered as living in farm area if they lived on a farm run by their family and have everyday contact with farm animals or animal feed. All other children were considered as living in city area. Asthma/allergic rhinitis diagnosis was defined previously by the doctors according to GINA and ARIA guidelines.^{5,6}

An AIT efficacy questionnaire⁷ has been designed to be filled in by the allergy specialist during a regular immunotherapy visit (based on the medical documentation) before and after AIT. The form includes evaluation of severity of symptoms related to asthma, rhinitis and conjunctivitis, as well as the intake and dosing of allergy and asthma medication. Each component was evaluated for a minimum score -2 (deterioration after AIT) and maximum score of $+2$ points (significant improvement after AIT). Total score reflected the average score for symptoms and drugs intake – a minimum score -2 (deterioration after AIT) and maximum score of $+2$ points (significant improvement after AIT).

The study was approved by the Ethical Committee of Medical University of LODZ, Lodz, Poland and a written consent was obtained from all the mothers before commencement of the study.

Statistical methods

During analysis of our data we used Chi square test to determine the difference between nominal variables. The associations between dependent, dichotomic variable and groups of independent variables (presented in

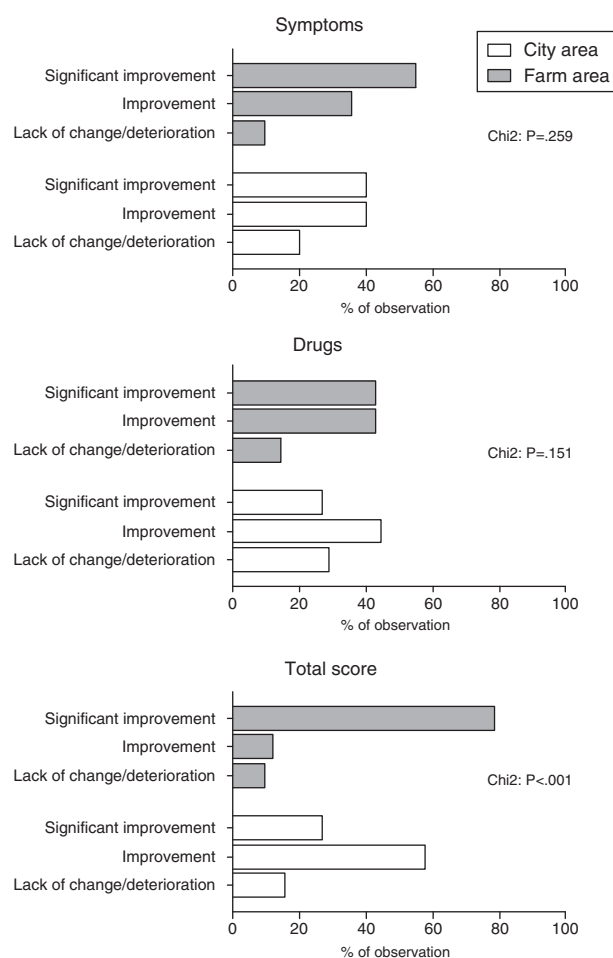


Figure 1 Comparison of the symptoms, drugs and total score after immunotherapy in children living in farm and city area.

Table 1) were analysed using logistic regression. First, logistic regression was used to assess the relationship between dependent variables and each one of the independent variables—univariate model. A stepwise forward procedure was then used to select variables. Predictors with p levels of at least 0.1 estimated in univariate models were included into multivariate regression analyses. All statistical analyses were performed using StatSoft Statistica for Windows, release 8.0 (StatSoft, Inc., Tulsa, USA). $p < 0.05$ was used as the definition of statistical significance.

Results

Eighty-seven children were included in the analysis. Clinical characteristics are given in Table 1.

We observed significantly higher improvement in total score among children from farm area compared to children from city area ($p < 0.001$). Between-group differences in symptoms and drug scores did not reach the level of significance. (Fig. 1).

In the next step dichotomised all scores (according to the following formula: 1 – significant improvement and 0 – others) and included as dependent variables into three different models of logistic regression analysis. Multivariate logistic regression analysis (adjustment for the effect of gender and

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