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RESEARCH ARTICLE

SENSITIZATION TO MOULD AEROALLERGENS IN CHILDREN WITH ASTHMA AND ALLERGIC RHINITIS

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ABSTRACT

Background: Approximately 80 fungus species have been reported to be connected with respiratory allergy. Moreover, it is proven that four of them are the most common: Alternaria, Cladosporium, Aspergillus, and Penicillium. Despite of this, sensitization rates to these mould aeroallergens in children with asthma and allergic rhinitis are underreported.
Objectives: The aim of this study was to investigate the sensitization rates to mould allergens and to establish the correlation between them and sensitization to the other most common aeroallergens.
Materials and methods: The study population consisted of 205 patients (126 boys and 79 girls) aged between 4 and 16 years with asthma and allergic rhinitis.
Skin prick tests (SPT) were performed with 4 mould allergens: Alternaria alternata, Cladosporium mix, Aspergillus mix, and Penicillium mix. Also, all patients were investigated by SPT to other 17 aeroallergens: pollens, mites, and allergens with animal origin.
Results: The study shows that 47 (29.93%) were sensitized to at least one mould allergen. Sensitization rates were as follow: to Alternaria alternata in 36 children (17.56%), to Aspergillus mix in 13 (6.34%), to Cladosporium mix in 12 (5.85%), and to Penicillium mix in 8 (3.9%). Often (n=33, 70.21%) sensitization to moulds were combined with sensitization to aeroallergens from the other investigated groups.
Conclusion: This study found a high tendency of sensitization to moulds in children population with asthma and allergic rhinitis. Alternaria alternata was the most common established allergen from this group. In more than two thirds of cases sensitization to moulds was combined with sensitization to other common aeroallergens.

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INTRODUCTION

Numerous published studies have reported, that prevalence rates of asthma and allergic rhinitis in children increased over the last two or three decades (Lundbäck, 1998; Gupta *et al*., 2007; De Marco *et al*., 2012). It is estimated that worldwide, between 1% and 20% of the children and young adults have asthma and around 20% of individuals (all age groups) have allergic rhinitis (Begin and Nadeau, 2014). In this context, identification of aeroallergen sensitization in the early stages of life is required in order to start a specific treatment and be able to modify allergic disease's natural history (Sharma *et al*., 2007). Mobility is increasing all over the world and allergists increasingly find themselves consulted by patients from other countries. In order to correctly diagnose respiratory allergies in these patients, it is useful to know the most important inhalant allergens in the different countries as they show a difference in distribution depending on the region. Despite of the fact, that the presence of IgE specific mould sensitivity is proven, childhood sensitization rates are underreported (Halonen *et al*., 1997; Taskinen *et al*., 1999; Cantani and Ciaschi, 2004). Skin prick test (SPT) is the standard for the diagnosis of IgE mediated allergic diseases. It is a safe, simple and inexpensive method that provides results quickly (Wood, 2002).

Objectives: The aim of this study was to evaluate sensitization rates of the most common mould aeroallergens in children with asthma and allergic rhinitis. In addition, we investigated the combination between sensitization to these allergens and other common airborne allergens (mites, pollens, allergens with animal origin).

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MATERIALS AND METHODS

In study were included 205 patients (126 boys and 79 girls) aged between 4 and 16 years (mean 8.25±3.31). Of them 93 (45.37%) were with moderate and severe persistent allergic rhinitis and 112 (54.63%) with well and partly controlled asthma (66 asthmatics (58.93%) presented with symptoms of allergic rhinitis simultaneously). The diagnosis and classification of diseases were based on international consensuses ARIA and GINA (ARIA, 2010; GINA, 2013).

The study population consisted of patients from Bulgaria (Southeast European country) referred to pediatric allergy center between October 2013 and February 2015. We performed SPT with the following commercial mould extracts (Stallergens, Alyostal prick, Antony, France):

- Alternaria alternata;
- Aspergillus mix;
- Cladosporium mix;
- Penicillium mix;

In addition all patients were investigated by SPT to other 17 common aeroallergens (Stallergens, Alyostal prick):

- Pollens: Weeds (Ambrosia elatior, Artemisia vulgaris, Medicago sativa, Urtica dioica, Plantago, Chenopodiaceae), Grasses (12 grasses, 4 cereals), Trees (Betulaceae, Fegaceae, Salycaceae);
- Mites: Dermatophagoides pteronyssimus and Dermatophagoides farinae;
- Epithelia and insects: Cat, Dog, Feathers mixture (Duck, Goose, Hen), Coakroach.

A histamine positive control and a glycerol negative control were also skin tested to reduce false positives and negatives. The positive data of previous ingestion of antihistamines were considered exclusion criteria for the test. The size of SPT was determined after 20 minutes by summing the largest wheal diameter and its perpendicular, and dividing the result by two. This mean wheal diameter (MWD) was qualified in relation to the negative control. An MWD of at least 3mm greater than the negative control was taken as positive.

Statistical analysis

The data from the survey wass processed with the statistical software package SPSS 19 and Microsoft Excel.

RESULTS

Skin prick testing showed that 47 out of 205 patients (22.93%) with asthma and allergic rhinitis had at least 1 positive result to mould aeroallergens (Fig. 1). Moreover, in 30 cases (63.83%) we established positive result only to 1 mould allergen, in 12 (25.53%) to 2 allergens and in 5 (10.64%) to 3 mould allergens. There wasn't a case, in which SPT to all 4 observed allergens were positive (Fig. 2). In these 205 patients, we found sensitization to Alternaria alternata in 17.56% (n=36); to Aspergillus mix in 6.34% (n=13); to Cladosporium mix in 5.85% (n=12) and to Penicillium mix in 3.90% (n=8) (Fig. 3).

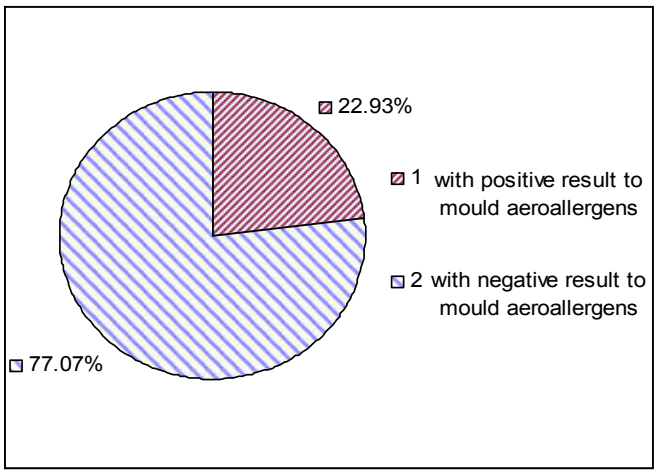

Fig. 1. Sensitization to mould aeroallergens in children with asthma and allergic rhinitis (at least 1 positive result)

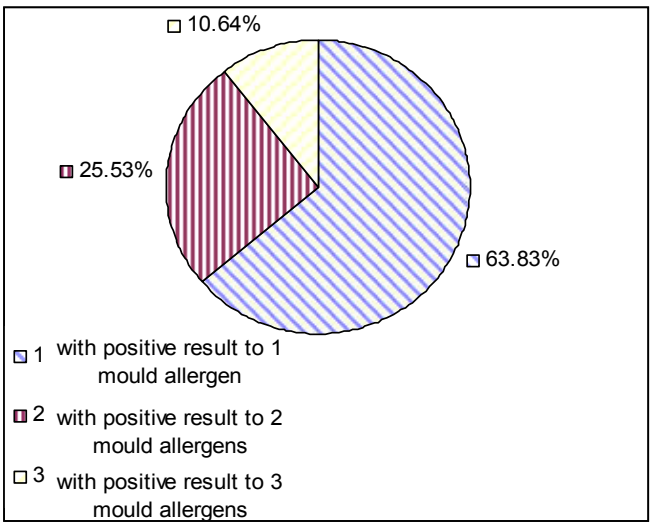

Fig. 2. Features of sensitization to mould allergens in children with positive result (n=47)

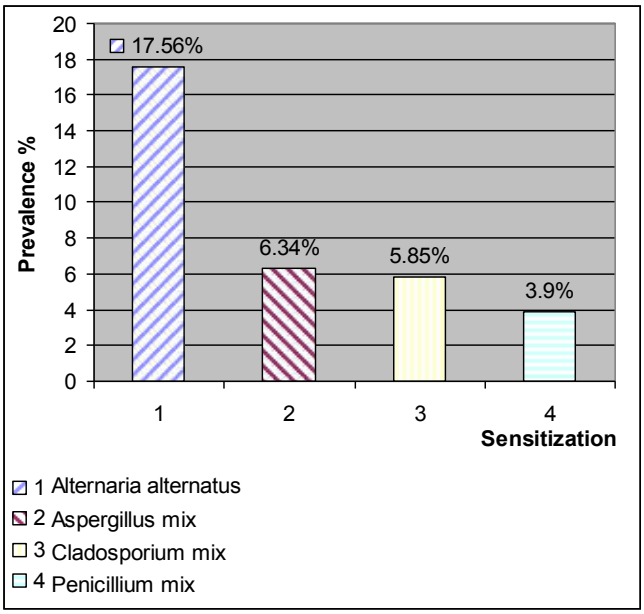

Fig. 3. Sensitization rates to Alternaria alternatus, Aspergillus mix, Cladosporium mix and Penicillium mix

In less than one third of the patients with positive result to moulds (n=47), we found sensitization only to aeroallergens from this group (n=14; 29.79%). In 33 children (70.21%) sensitization to moulds combined with sensitization to other common aeroallergens as follows: in 18 (38.30%) to mites, in 16 (34.04%) to pollens and in 10 (21.28%) to allergens of animal origin (Fig. 4).

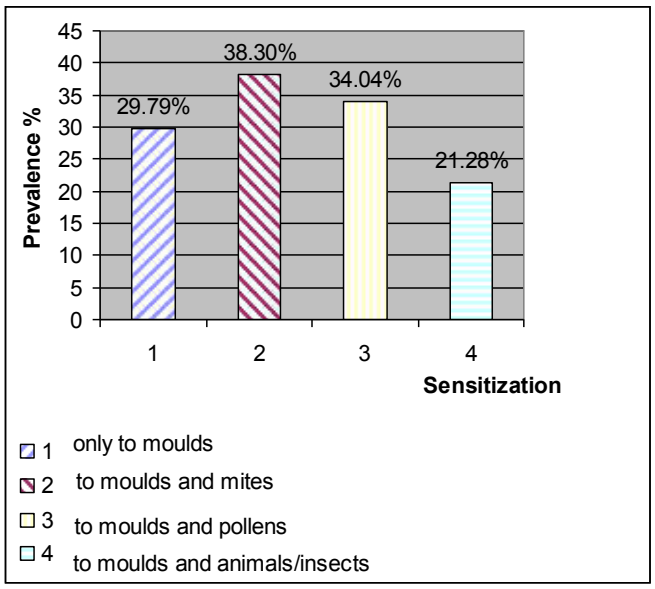

Fig. 4. Characteristics of sensitization to moulds in combination with sensitization to other aeroallergens

DISCUSSION

Several fungal species (usually moulds) cause allergic reaction in humans. The most common and best described mould allergen sources belong to the taxonomic group fungi imperfecti (usually Ascomycetes) (Shin-Wen, 2015). Alternaria and Cladosporium species are common in outdoor environments worldwide. Their airborne spores and mycelium debris present during spring, summer and especially autumn because of the degradation of leaves and other biomaterial (Cecchi *et al*., 2010). In indoor environments, Aspergillus and Penicillium species predominate with relatively few characteristic seasonal changes (Manning *et al*., 1989; Antova *et al*., 2008).

In our study we found sensitization to mould allergens in relatively high frequency- in 22.93% of patients. Sensitization to only one mould allergen in children was almost twice greater than sensitization to two or three allergens. Alternaria alternata was the predominant sensitization factor (17.56%) and its rates were equal to sensitization to the other three investigated mould allergens (Cladosporium, Aspergillus and Penicillium) together. Sensitization to moulds very often (more than two thirds of the cases) was combined with sensitization to other common aeroallergens.

Sensitization rates to Alternaria alternata in our study were similar to these received in other countries from the Southeastern part of Europe (Greece) (Zureik *et al*., 2002). In literature we could not find enough contemporary data about sensitization rates to Cladosporiun, Aspergillus and Penicillium in children with asthma and allergic rhinitis (Heinzerling *et al*., 2005). Also, in other studies devoted to this problem, we could not find data about combination between sensitization to moulds and sensitization to other common airborne allergens in children with respiratory allergic diseases (Pendino *et al*., 2011; Sahinez *et al*., 2013).

Conclusion

This study found a high tendency of sensitization to moulds in children population with asthma and allergic rhinitis. Alternaria alternata is the most common established allergen in this group. Because of the rapid changes in allergen spectrum of sensitization to aeroallergens, contemporary studies are required.

REFERENCES

Antova, T., Pattenden, S., Brunekreef, B., *et al*. 2008. Exposure to indoor mould and children's respiratory health in the PATY study. J Epidemiol Community Health. Aug 2008; 62(8):708-14 (Medline)

ARIA- Allergic Rhinitis and its Impact on Asthma. 2010 Revision

Begin, P. and Nadeau, K.C. 2014. Epidemic regulation of asthma and allergic disease. *Allergy Asthma Clin Immunol.,*10:27

Cantani, A. and Ciaschi, V. 2004. Epidemiology of Alternaria alternata allergy: A prospective study in 6840 Italian asthmatic children. *Eur Rev Med Pharmacol Sci.,* 8:289-294 (PubMed)

Cecchi, I., D'Amato, G., Ayres, J.G., *et al*. 2010. Projections of the effects of climate change on allergic asthma: the contribution of aerobiology. Allergy. Sep 2010; 65(9):1073-81 (Medline) (Full Text)

De Marco, R., Cappa, V., Accordini, S., *et al*. 2012. Trends in the prevalence of asthma and allergic rhinitis in Italy between 1991 and 2010, European Respiratory Journal, DOI: 10.1183, Published 1 April 2012

GINA- Global Initiative for Asthma. Updated 2013

Gupta, R., Sheikh, A., Strachan, D.P., *et al*. 2007. Time trends in allergic disorders in the UK. Thorax, 62:91-96

Halonen, M., Stern, D.A., Wright, A.L., *et al*. 1997. Alternaria is a major allergen for asthma in children raised in a desert environment. *Am J Resp Crit Care Med.,* 155:1356-1361

Heinzerling, G., Frew, A.J., Bindslev-Jensen, C., *et al*. 2005. Standard skin prick testing and sensitization to inhalant allergens across Europe – a survey from the GA^{2}LEN network. Allergy, DOI: 10.1111/j.1398-9995.2005.00895.x

Lundbäck, B. 1998. Epidemiology of rhinitis and asthma. Clinical and Experimental Allergy: *Journal of the British Society for Allergy and Clinical Immunology*, 28 Suppl 2:3-10

Manning, S.C., Vuitch, F., Weiberg, A.G. and Brown, O.E. 1989. Allergic aspergillosis: a newly recognised form of sinusitis in the pediatric population. Laryngoscope. Jul 1989; 99 (7 Pt 1): 681-5 (Medline).

Pendino, P., Agüero, C., Cavagnero, P., *et al*. 2011. Aeroallergen sensitization in wheezing children from Rosario, Argentina. *WAO Journal,* October 4(10);159-163.

Sahinez, U., Buyuktiryaki, A., Yavuz, S., *et al*. 2013. The spectrum of aeroallergen sensitization in children dignosed with asthma during first 2 years of life. Allergy and Asthma Proceeding. 07/2013; 34(4):356-61.

Sharma, H.P., Hausel, N.N., Matsui, L., *et al*. 2007. Indoor environmental influences on children's asthma. *Pediatr Clin North Am.,* 54:103-120.

Shin-Wen, H. 2015.Mold allergy.www.emedicine.com Available at http:/emedicine.medscape.com/ article/887374 – overview.Accessed: January, 2016.

Taskinen, T., Hyvärinen, A., Meklin, T., *et al*. 1999. Asthma and respiratory infections in school children with special reference to moisture and mold problems in the school. *Acta Pediatr.,* 88:1373-1379 (PubMed).

Wood, R.A. 2002. Skin testing: making the most of every prick. *Au Allergy Asthma Immunol.,* 88:347-349.

Zureik, M., Neukirch, C., Leynaert, B., *et al*. 2002. Sensitisation to airborne moulds and severity of asthma: cross sectional study from European Community respiratory health survey. *BMJ,* 325:411-419.

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