The Association of Month of Birth with Allergic Sensitization in Pediatric Patients with Asthma in Mureș County, Romania

Căpîlna Brîndușa[1], Baghiu Maria Despina[1], Căpîlna R

[1] Pediatric Clinic, University of Medicine and Pharmacy, Tîrgu Mureș, Romania
[2] County Emergency Clinical Hospital, Tîrgu Mureș, Romania

Objective: To demonstrate a link between the allergy disease and birth date, starting from the hypothesis that the season of birth may affect the future development of allergy.
Methods: Our prospective study included eighty-six asthmatic children, with ages between 1 and 18 years, who were admitted to the Clinic of Pediatrics I from Tîrgu Mureș, Romania, between October 2008 and June 2010. We analyzed the age, month of birth, sensitization to a given antigen (Dermatophagoides pteronyssinus, Dermatophagoides farinae, milk proteins, egg, mold, dog epithelium, cat epithelium, soya, carrot, potatoes, peanuts, tomato). Specific IgE serum levels to allergens were measured. RAST equal or higher than class 1 was considered as positive. This data was combined with the presence of different types of allergens during the year. The study was extended to the intrauterine period, when the fetus is also faced with different type of antigens, and maternal antibody.
Results: We observed the appearance of three "waves", in February, April, September and early October the incidence of allergic sensitization was higher than in other months.
Conclusions: Our results support the hypothesis that the first few months of life represent a sensitive period, during which protection from exposure to pollen allergens may be associated with decreased sensitization to pollens.

Keywords: sensitization, children, allergy, atopy, IgE, birthday, conception, asthma

Received: 6 November 2012

Introduction

It is well known that allergic diseases occur as a consequence of genetic and environmental interactions. Since allergic diseases have been increasing in recent decades, the impact of environmental factors on the prevalence of allergic diseases has become a growing concern throughout the world. Improving our understanding of the causes of increase in allergic diseases may help to improve treatments and preventive strategies [1,2].

Earlier reports have demonstrated a positive association between sensitization to pollens and the month of birth between March–May and January–May [1,2]. Other studies have identified a trend in subjects born in the grass pollen season (May–June) to have an increased risk to develop grass pollen allergy in childhood [3,4].

Allergy disease can be triggered by prenatal exposure to certain allergens including mites in household pets, according to a study, which compared households with pets and those without [5,6].

A recent population-based cohort study, conducted in Finland, suggested that early pregnancy sensitizes the offspring to food allergens more than other children born at other times [7]. The study concluded that children whose gestational period coincided with the pollen season for broad-leafed trees became sensitized to food allergens more than other children, whose gestational period fell outside of this period [6].

Correspondence to: Brîndușa Căpîlna
E-mail: brindusarc@yahoo.com

The relation between the season of birth and the development of allergy to seasonal allergens is further complicated by a Finnish study suggesting that weaning during the birch or grass pollen seasons was associated with a reduced risk for later development of allergic manifestations [7]. Interpreting, this suggested that children conceived within the first few months of the year tend to develop food allergy [8,9]. Their exposure to pollen during the fetal stage is seen as the link to childhood conditions like eczema. Another study also supports this finding, revealing that conception in the spring later induces food allergies three times more than if the conception occurs in the autumn. By the time these children reach the age of 4, one out of 5 shall have developed a food allergy [8,9]. This study found higher concentrations of food IgE antibodies in children born in autumn than those in spring or summer months. The researchers, however, alluded the cause to other factors, such as viral infections or the lack of Vitamin D in those months [10].

The aim of the present study was to determine the association between the month of birth and atopic sensitization to inhalant or food allergens in child patients with respiratory diseases (asthma) from Mureș County, Romania, using the diagnostic method of RAST tests. We also aimed to demonstrate the linkage between the intrauterine period and atopy.

Materials and methods

We conducted a prospective cross-sectional study, which included 86 allergic children aged between 1 and 18 years,

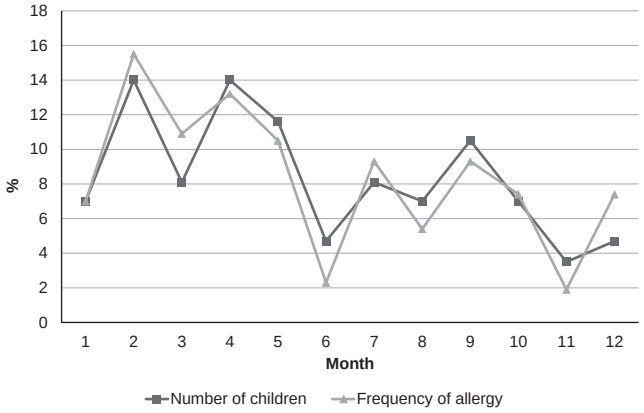

Fig. 1. The monthly spread according to the date of birth, with the three elevations in February, April and September

admitted to the Clinic of Pediatrics I from Târgu Mureș, Romania, between October 2008 and June 2010. All patients signed an informed consent regarding participation in the study.

Inclusion criteria:

1. All patients with asthma bronchiale who underwent specific IgE test to allergens.
2. All patients with known birth date.

Exclusion Criteria:

1. Patients with other diseases than asthma.
2. Passive smokers.

Asthma was diagnosed according to the definition of the American Thoracic Society [11].

We collected data from the children and their parents regarding the patients' age, month of birth, sensitization to a given antigen (Dermatophagoides pteronyssinus, Dermatophagoides farinae, milk proteins, egg, mold, dog epithelium, cat epithelium, soya, carrot, potatoes, peanuts, tomato). Specific IgE serum levels to allergens were measured. RAST equal or higher than class 1 was considered as positive.

For statistical analysis MedCalc and GRAPH Pad Prisma software have been used. Parameters were compared using a 2 × 2 contingency table, Chi square test. Value of p

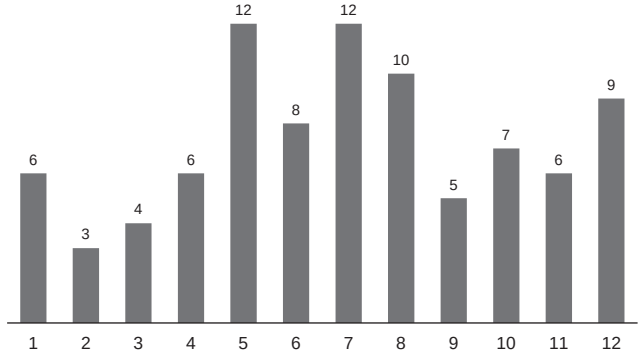

Fig. 3. The monthly spread according to the date of conception. Approximated calculation

Fig. 2. Pollen allergens on the Romanian territory [12]

<0.05 was considered statistically significant. Correlations were studied using Pearson test.

Results

In the first step of our study we searched the link between the year of birth and allergy, but the results were not statistically significant, therefore the research continued with the month of birth.

The link between the month of birth and the incidence of allergic disease was statistically significant. Plotting these two parameters in Figure 1, we observed the appearance of three "waves", in February, April, September and early October the incidence of allergy being higher (between 13.2% and 15.5%) than in the other months (under 9.09%, with the lowest value of 1.9% in November.

Next, we wanted to demonstrate the presence of allergens in these periods of the year in our region. Figure 2 shows the spread of allergens in our region. According to this figure, the first two waves in Figure 1 chime with the February–April period on Figure 2. For the third wave we can assume that the etiology is intrauterine, and the sensitization took place during the last three intrauterine months, when possibly the mother had an elevated IgE level.

Taking a step further, we wanted to take in the study the intrauterine period. Because we could not find the exact conception date in the case history, we had to calculate the possible conception period. For this approximation, we took the birth month and substracted 40 weeks, which is the mean gestational period. For example: for a child born in March, the approximated conception date was in June. Introducing the data in a chart, revealed that the children conceived in the summer period (May–August) are statistically significantly more sensitized.

We also examined the quantitative aspects (frequency of allergies, No and%) to see the percentage of children with allergic sensitization, for each month. The highest rates were observed in February – 15.5%, April – 13.2%, March – 10.9% and May (month of flowers) – 10.5% (Table I).

Also we have established qualitative relationships between sensitization ranked from 1 to 6. As it is apparent in Table I, type 6 allergic sensitization is more common in July, type 5 in September, type 4 and 3 in April, and type 2 and 1 in February.

Table I. Data centralization

Month	No. of children		Frequency of sensitization		A6	A5	A4	A3	A2	A 1
	No.	%	No.	%	No.	No.	No.	No.	No.	No.
01	6	7.0	18	7.0	2	0	0	1	7	8
02	12	14.0	40	15.5	4	0	1	7	14	14
03	7	8.1	28	10.9	0	2	2	6	11	7
04	12	14.0	34	13.2	4	0	4	10	10	6
05	10	11.6	27	10.5	2	2	1	2	12	8
06	4	4.7	6	2.3	1	0	0	0	2	3
07	7	8.1	24	9.3	5	0	1	5	6	7
08	6	7.0	14	5.4	2	0	3	1	2	6
09	9	10.5	24	9.3	0	5	3	1	5	10
10	6	7.0	19	7.4	0	2	1	1	13	2
11	3	3.5	5	1.9	0	0	0	0	3	2
12	4	4.7	19	7.4	0	0	0	6	9	4
Total	86	100.0	258	100.0	20	11	16	40	94	77

Discussions

The results of the present study are in accordance with previous studies showing association between the month of birth and sensitization to pollen allergens.

Subjects born in the pollen season (March–April) have been shown to have an increased risk of being sensitized to birch pollen [6]. Another study also supported an increased risk of developing allergic skin sensitization for grass pollen in patients born in February, May and June [4] and an association between allergic diseases, such as hay fever, and the month of birth [7]. A protective effect has been reported for certain months of birth: September for allergic sensitization, October for asthma, and November for hay fever [7].

Early infancy seems to be a period of particular susceptibility to sensitization, as indicated by epidemiological and experimental studies [13]. There is increasing evidence that both prenatal and perinatal events influence both allergic diseases and early-life respiratory morbidity [14], for example, the season of birth may affect the future development of allergy [15].

In this study we have shown that the allergy disease is linked to birthday, but more significantly to the intrauterine period, which involves a lot of factors as: maternal health status and immunity, allergen levels in the intrauterine period and after, viral infections, vitamin intake pre- and postpartum, breastfeeding, a.s.o.

The size of the study groups allowed us to detect an association between manifestations of atopy and season of birth. The study was not intended to be epidemiological, as children with a family history of allergy were greatly overrepresented and the children were not randomized for the comparisons.

This is the first study showing association of children atopy and birth date in Romania.

Conclusions

Sensitization to allergens might be influenced by environmental effects in the early months of life in genetically susceptible individuals.

Our results support the hypothesis that the first few months of life represent a sensitive period, during which protection from exposure to pollen allergens may be associated with decreased sensitization to pollens. The results of this study could assist in identifying high risk groups for atopic sensitization which in turn will guide future preventive services.

Planning the birth date for babies is a possible recommendation for parents with a strong family history of pollen allergy.

We hope that in the future we can extend this study and we could split to different groups with sensitization to different antigens.

References

1. Björksten F, Suonemi I. Dependence of immediate hypersensitivity on the month of birth. Clin Allergy. 1976;6:165-71.
2. Quoix E, Bessot JC, Kopferschmitt-Kubler MC, Fraisse P, Pauli G. Positive skin tests to aero-allergens and month of birth. Allergy. 1988;43:127-31.
3. Graf N, Johansen P, Schindler C, Wuthrich B, Ackermann-Liebrich U, Gassner M, et al. Analysis of the relationship between pollinosis and date of birth in Switzerland. Int Arch Allergy Immunol. 2007;143:269-75.
4. Wjst M, Dold S, Reitmeir P, Stiepel E, Von-Mutius E. Month of birth and allergic disease at the age of 10. Clin Exp Allergy. 1992;22:1026-31.
5. ***Schonberger et al (2005). Prenatal exposure to mite and pet allergens and total serum IgE at birth in high-risk children. Pediatric Allergy & Immunology: PubMed. Retrieved on June 5, 2011 from http://www.ncbi.nlm.nih.gov/pubmed/18702655
6. ***Aichbhaumik N et al (2008). Prenatal exposure to household pets influences fetal immunoglobulin E production. Clinical & Experimental Allergy: PubMed. Retrieved on June 5, 2011 from http://www.ncbi.nlm.nih.gov/pubmed/18702655
7. ***Pyrhonen, K. et al (2010). Season of the first semester of pregnancy predicts sensitization to food allergens in childhood: a population-based cohort study from Finland. Journal of Epidemiology & Community Health: BMJ Journals. Retrieved on June 5, 2011 from http://jech.bmj.com/content/early/2010/09/28/jech.2009.105411.abstract
8. Brussee JE, Smit MA, van Strien RT, Corver K, Kerkhof M, Wiga AH, et al. Allergen exposure in infancy and the development of sensitization, wheeze, and asthma at 4 years. J Allergy Clin Immunol. 2005;115:946-52.
9. Peters JL, Suglia SF, Platts-Mills TAE, Hosen J, Gold DR, Wright RJ. Relationships among prenatal aeroallergen exposure and maternal and cord blood IgE: Project ACCESS. J Allergy Clin Immunol. 2009;123:1041-6.
10. ***Thomas, K. (2010). Birth timing, pollen exposure may predict risk for food allergies. Medscape Medical News: WebMD, LLC. Retrieved on June 5, 2011 from http://www.medscape.com/viewarticle/731487

11. American Thoracic Society. Standards for the diagnosis and care of patients with chronic obstructive pulmonary disease (COPD) and asthma. Am Rev Respir Dis. 1987;136:225-44.
12. ***ZEWA, http://zewa01-master.pxpgroup.com/promotions/zewahay-fever-relief/pollen-calendar
13. Holt PG. Environmental factors and primary T-cell sensitization to inhalant allergens in infancy: reappraisal of the role of infections and air pollution. Pediatr Allergy Immunol 1995;6:1-10.
14. Kumar R. Prenatal factors and the development of asthma. Curr Opin Pediatr. 2008;20(6):682-7.
15. Björkstén F, Suoniemi I, Koski V. Neonatal birch-pollen contact and subsequent allergy to birch pollen. Clin Allergy. 1980;10:585-91