Home allergies among 5th–9th grade schoolchildren in Vilnius, Lithuania

Genė Šurkienė¹,
Rūta Dubakienė², ³*,
Rimantas Stukas¹,
Vilija Sudeikytė¹,
Nijolė Janulevičiūtė³

¹ Public Health Institute,
Faculty of Medicine, Vilnius University,
M. K. Čiurlionio 21,
LT-03101 Vilnius, Lithuania

² Sector for Allergology and
Clinical Immunology,
Biologically Active Materials
Research Centre, Vilnius University,
M. K. Čiurlionio 21,
LT-03101 Vilnius, Lithuania

³ Faculty of Medicine,
Vilnius University,
M. K. Čiurlionio 21,
LT-03101 Vilnius, Lithuania

Allergic diseases are common in children worldwide. The study aimed at investigating the prevalence of house allergies among 5th–9th grade schoolchildren in Vilnius. Anonymous questionnaires were filled in by 540 respondents – schoolchildren aged 10 to 15. 18.4% prevalence of home allergies was revealed in the survey. The prevalence in boys was higher than in girls (19.9% versus 16.9%) without a significant difference. The highest prevalence of home allergies was observed among 15- and 14-year-old respondents. One third of all surveyed families involved other family members suffering from allergies. Schoolchildren with allergies manifested a lower estimation of their health rather than those without. In most cases, children suffering from home allergies complained of common cold (coryza) (40.4% of respondents), watery eyes and itching (20.2%), difficulty in breathing (19.2%), body rash (16.2%). We observed more children with home allergies in houses with black-spotted bathroom walls and the rather than in those without (7.1% and 1.4% respectively).

Key words: schoolchildren, prevalence, home allergies, health

INTRODUCTION

Allergic diseases are an increasingly growing threat to children's health worldwide. The causes of their clinical diversity and modification as well as their growing prevalence have so far received little investigation. The increasing number of allergic diseases is definitely related to environmental pollution, application of chemicals in households to our lifestyle. According to the scientific data, diverse prevalence of allergic diseases is common not only to different countries, but also to different locations countrywide (Beasley et al., 1998; Broberg et al., 2000; Mortz et al., 2004; ISAAC Phase…; Global Burden…). The differences are likely to depend on social, economic, genetic and other factors (Alfven et al., 2005; Braback et al., 2004; Demir et al., 2004; Dotterud et al., 2004; Girolomoni et al., 2005).

Their home environment is the place where schoolchildren spend most of their time. Most common home allergens include house dust mites (Dermatophagoides pteronyssinus), epidermic allergens of pets, i. e. cats and dogs, domestic chemical substances. These factors have a huge impact on the increasing number of allergic diseases (Alfven et al., 2005; Chung et al., 2003; Ronmark et al., 2002). Apart from that, over the last 20 years people all over the world have improved their living conditions: the insulation of their houses and the tightness of their windows have improved. These conditions have triggered formation of a warm and in many cases damp, poorly ventilated environment which ideally suits for producing house dust mites (Custovic et al., 1998; Dubakiene et al., 2004). Furthermore, the growing number of allergens...
is also related to carpet-fitted floors and air conditioners, introduced in the home environment. Evidence has been found that damp house microclimate and moulds increase the likelihood of developing asthma, allergic rhinitis and other respiratory tract infections (Kosker et al., 2005).

Taking into account the evidence that the prevalence of allergies is diverse even in towns and villages within a country ((Beasley et al., 1998; Broberg et al., 2000; Mortz et al., 2004; ISAAC Phase...; Global Burden...), we focused on investigating the prevalence of home allergies among schoolchildren of secondary schools of Vilnius, the largest Lithuanian city hosting diverse nationalities with a variety of lifestyles.

METHODS

A survey on the prevalence of home allergies was conducted in November 2005 – December 2006 in Vilnius.

The expected prevalence of home allergies was 15%, maximum error being 3%. The survey sample size was calculated using EpiInfo Version 6; 540 schoolchildren of 5th–9th grades were surveyed for a representative survey; 710 questionnaires were circulated; 540 of them were filled in and found appropriate for the analysis (response rate 76.1%).

A modified WHO questionnaire with additional questions about home conditions was used to evaluate the prevalence of home allergies among schoolchildren. The questionnaire covered 44 items with questions about demographic characteristics, urticaria and atopic dermatitis symptoms (sneezing, common cold, watery and itching eyes, shortness of breath, etc.), home characteristics (house dust, microscopic fungi or moulds, pollen, insect venom, pet fur, domestic chemicals, medicines, etc.).

The questionnaire was tested by a pilot study. The Kappa Coefficient was calculated using Medcalc. Its value ranged from 0.3 to 1.0. Questions that by the Kappa Coefficient were evaluated below 0.4, were estimated as changing their wording. After that, the questionnaires were circulated among the respondents.

Data analysis was conducted applying EpiData 2.1, SPSS statistical packages for Windows 11.0 and WinPepi 1.55. The prevalence of home allergies was expressed in percentage. The 95% confidence interval (CI) was chosen. The $\chi^2$-test and Fisher’s exact test were applied to evaluate the correlation between the indices. The correlation level ($\alpha = 0.05$; $p < 0.05$) was statistically significant (Armitage et al., 2002; Čekanavičius, Murauskas, 2003).

RESULTS AND DISCUSSION

The questionnaires were completed by 267 girls (49.4%) and 271 boys (50.6%). The average age of respondents was $13.4 \pm 1.23$ years.

The majority of respondents (55.2%) evaluated their health as good, 23.7% as very good, 19.1% as satisfactory, 1.7% as bad and 0.3% as very bad.

The prevalence of home allergies found in boys was 19.9% and in girls 16.9% (Table 1), however, the difference was statistically not significant.

<table>
<thead>
<tr>
<th>Gender</th>
<th>Home allergy positive</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Boys</td>
<td>19.9</td>
<td>15.34–24.88</td>
</tr>
<tr>
<td>Girls</td>
<td>16.9</td>
<td>12.57–21.56</td>
</tr>
</tbody>
</table>

$\chi^2 = 0.589, p = 0.443$.

The prevalence of home allergies among schoolchildren aged 15 and 14 was 25.0% and 21.8%, respectively ($p = 0.215$).

It is worth noting that home allergy is related to the self-evaluation of health ($p = 0.002$). Schoolchildren without house allergies showed a better estimation of their health state (Table 2).

Data of researchers investigating the respondents’ concern about their health revealed a correlation between the self-evaluation of health state and being sick with a number of diseases (Fernandez-Caldas et al., 2005). In spite of our respondents’ immaturity, we can assume that the reason why the sick children evaluated their health worse than the healthy ones was their suffering from home allergies.

Almost 80% of schoolchildren with house allergies referred to other members of their family who were suffering from house allergies. However, the percentage of healthy children was 24.4 ($p < 0.001$). The researchers provide evidence that allergy is inherited. The discovered allergy gene is the proof of it. Consequently, children are likely to develop this disease if their parents are allergic (Girolomoni et al., 2005;...
Chung et al., 2003; Van Cauwenberge, 2006; O’Connel, 2003). In most cases, more than one symptom is characteristic of allergic diseases. In fact, a complex of symptoms typical of allergic diseases is displayed (Berger, 2003; Vignola et al., 2001). Van Cauwenberge et al. (2003) notify that even 95% of people suffering from bronchial asthma complain of the symptoms common to allergic rhinitis. Schoolchildren that had complaints indicated common cold (coryza) (40.4% of respondents), occurrence of watery eyes and itching (20.2% of respondents), difficulty in breathing (19.2%), body rash (16.2%), fits of sneezing (16.2%), shortness of breath (6.1%).

A number of symptoms exhibit a similarity to those typical of other diseases in children. Our study revealed a distinction in the symptoms indicated by those with home allergies and those without: shortness of breath \((p = 0.04)\), difficulty in breathing \((p < 0.001)\), frequent common cold (coryza) \((p = 0.008)\), fits of sneezing \((p = 0.002)\), watery and itching eyes \((p = 0.001)\), body rash \((p = 0.001)\). The distribution of these ailments was higher in those with house allergies rather than in those without.

Analysis of these ailments in boys and girls suffering from home allergies has revealed that boys show a more frequent shortness of breath, difficulty in breathing, phlegm production and skin itching (Figure).

Data on the distribution of allergies and their symptoms among boys and girls differ. In a report of Japanese researchers, allergic rhinitis was observed in 12.4% of 3–15 aged boys and in 8.0% of girls (Okubo et al., 2004). Montefort and co-authors (2002) found more cases of bronchial asthma in boys than in girls. Meanwhile, Selnes et al. (2005) reported no significant difference in the gender distribution of atopic dermatitis and allergic rhinitis.

Nearly half (49.5%) of schoolchildren with home allergy indicated the occurrence of bothering ailments in particular seasonal months, whereas 34.2% \((p = 0.006)\) schoolchildren without home allergy reported the occurrence of ailments at certain seasonal months (Table 3). Scientific literature provides evidence that seasonal characteristics are common to one kind of home allergies – bronchial asthma, triggered by

**Table 3. The number of schoolchildren relating their ailments to seasons**

<table>
<thead>
<tr>
<th>Month</th>
<th>Home allergy (positive)</th>
<th>Home allergy (negative)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>%</td>
<td>95% CI</td>
</tr>
<tr>
<td>January</td>
<td>30.6</td>
<td>18.25–44.06</td>
</tr>
<tr>
<td>February</td>
<td>18.4</td>
<td>8.76–30.22</td>
</tr>
<tr>
<td>March</td>
<td>22.4</td>
<td>11.77–34.99</td>
</tr>
<tr>
<td>April*</td>
<td>22.4</td>
<td>11.77–34.99</td>
</tr>
<tr>
<td>May*</td>
<td>36.7</td>
<td>23.42–50.54</td>
</tr>
<tr>
<td>June*</td>
<td>24.5</td>
<td>13.34–37.31</td>
</tr>
<tr>
<td>July*</td>
<td>24.5</td>
<td>13.34–37.31</td>
</tr>
<tr>
<td>August</td>
<td>8.2</td>
<td>2.27–17.20</td>
</tr>
<tr>
<td>September</td>
<td>28.6</td>
<td>16.58–41.85</td>
</tr>
<tr>
<td>October</td>
<td>28.6</td>
<td>16.58–41.85</td>
</tr>
<tr>
<td>November</td>
<td>36.7</td>
<td>23.42–50.54</td>
</tr>
<tr>
<td>December</td>
<td>42.9</td>
<td>28.82–56.79</td>
</tr>
</tbody>
</table>

*p < 0.05.
Table 4. Distribution of symptoms in home allergy schoolchildren dependent on seasons

<table>
<thead>
<tr>
<th>Month</th>
<th>%</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>April</td>
<td>sneezing</td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>watery eyes</td>
<td>45.5</td>
</tr>
<tr>
<td></td>
<td>itching skin</td>
<td>45.5</td>
</tr>
<tr>
<td>May</td>
<td>frequent colds</td>
<td>38.9</td>
</tr>
<tr>
<td></td>
<td>watery eyes</td>
<td>38.9</td>
</tr>
<tr>
<td></td>
<td>cough</td>
<td>33.3</td>
</tr>
<tr>
<td>June</td>
<td>watery eyes</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>difficulty in breathing</td>
<td>41.7</td>
</tr>
<tr>
<td></td>
<td>frequent colds</td>
<td>41.7</td>
</tr>
<tr>
<td>June</td>
<td>sneezing</td>
<td>41.7</td>
</tr>
<tr>
<td>July</td>
<td>watery eyes</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>difficulty in breathing</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>cough</td>
<td>33.3</td>
</tr>
<tr>
<td></td>
<td>production of phlegm</td>
<td>33.3</td>
</tr>
</tbody>
</table>

Taking into account that moulds in home environment are present in damp and poorly ventilated bathrooms, the respondents were asked to describe the walls and the ceiling of their bathrooms (black-spotted or clean). Even though clean bathroom walls and ceilings were indicated by the majority of our respondents, 7.1% of the sick respondents claimed spotted bathroom walls and ceilings. Of the rest with black-spotted bathroom walls and ceilings, 1.4% were found not suffering from home allergies (p = 0.004). A strong association between black spots and home allergy was estimated (prevalence rate 5.11; 95% CI 1.76–14.89; p = 0.004).

CONCLUSIONS

1. The prevalence of home allergies among schoolchildren in Vilnius comprised 18.4%. A similar prevalence of home allergies was observed among boys and girls. The age-dependent prevalence of home allergies was found in children aged 15 and 14 years.

2. Three times more children were found to have home allergies in families with other family members suffering from home allergy, rather than in families without allergy.

3. 40.4% of sick respondents indicated symptoms of common cold (coryza), 20.2% watery eyes and itching, 19.2% difficulty in breathing, 16.2% fits of sneezing, 16.2% body rash, 6.1% shortness of breath.

4. Pupils with house allergy estimated their health worse than those without house allergy.

5. Home allergy occurrence depended on the month of a season.

6. Potential home allergens were present in the apartments of both sick and healthy respondents. Nevertheless, the number of allergic children living in houses with blackened bathroom walls and ceiling (a source of micromycetes) exceeded the number of those without allergy.

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Genė Šurkienė, Rūta Dubaki enė, Rimantas Stukas, Vilija Sudeikytė, Nijolė Janulevičiūtė

**VILNIAUS MOKYKLŲ 5–9 KLASIŲ MOKINIŲ BŪSTO ALERGIJOS**

**Santrauka**

Alergines ligos – aktuali viso pasaulio vaikų sveikatos problema. Aiškinantis būsto alergijų paplitimą tarp Vilniaus mokyklų 5–9 klasių mokinių anoniminių ankstynės apklausos būdu aptikta 540 10–15 metų mokinių. Tyrimo duomenimis, būsto alergijų paplitimas siekia 18,4 %. Tarp berniukų būsto alergijų paplitimas didesnis nei tarp mergaičių (atitinkamai 19,9 ir 16,9 %), tačiau šis skirtumas nereikšmingas. Didžiausias būsto alergijų paplitimas tarp 14 ir 15 metų respondentų – atitinkamai 25,0 ir 21,8 %. Mokiniai, sergantys būsto alergijomis, savo sveikatą vertino blogiau nei neiser gantys. Vaikai, sergantys būsto alergijomis, dažniausiai skundėsi dažnomis sklogomis (40,4 % respondentų), akių širdžių ir niekam nereskintos (18,5 %). Būsto alergijomis sergančių vaikų, kurių vonios mas nereikšmingas. Didžiausias būsto alergijų paplitimas tarp 14

**Raktąžodžiai:** mokiniai, paplitimas, būsto alergijos, sveikata