

Food allergies among 5th–9th grade schoolchildren in Vilnius (Lithuania)

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Allergic diseases are a frequent disorder of children health the world over. The prevalence of food allergies among schoolchildren in Vilnius was estimated by an anonymous, questionnaire-based survey. 540 schoolchildren answered the questionnaire. The prevalence of food allergies among schoolchildren was 12.8%. It was independent of the gender and age of respondents. The pupils who did not have food allergies estimated their state of health better than those who did have it. There were two times more children who had food allergy in the families where family members had food allergy, than in families without food allergy. Schoolchildren that had food allergies mostly suffered from body rashes (34.8% of respondents), short breath (14.5%), running and itchy eyes (34.8%). 1.3% of schoolchildren had urticaria; they were mostly allergic to eggs, strawberries, wild strawberries, chocolate and oranges; 1.9% of schoolchildren had atopic dermatitis; they did not tolerate milk, wild strawberries and nuts.

Key words: schoolchildren, prevalence, food allergy, atopic dermatitis, urticaria

INTRODUCTION

Allergic diseases are among the most frequent disorders of children's health all over the world. The causes of these diseases and their growing prevalence are still little known. Rising of allergies over the last three decades is associated with environmental pollution, daily use of chemicals, consumption of new food, etc. Allergy to food and its natural or artificial ingredients causes children a lot of difficult physical and psychological ailments. Prevalence of food allergy depends much on nutritional habits. Paediatric allergy to cow milk, which was common in the first half of the 20th century due to the frequent use of formulae, is declining now because of popular breast-feeding and the use of cow's milk hydrolysates. On the other side, societal nutritional habits and presence of potential allergens (such as peanuts, soy and kiwi) in food greatly influence the disparities in children's food allergy around the world (Aas et al., 1997). Prevalence of allergic diseases differs not only in the different countries, but also in the cities and districts of the same state. Research in former East and West Germany has shown that there are disparities of incidence of allergic diseases between West and East Europe, especially in its post-communist countries.

About 35% of people suffer from allergies in the old EU (Dubakienė, 2002). Research in the UK revealed that 20% of population suffer from food allergy (Young et al., 1994). Wuthrich states that atopic diseases (allergic rhinitis, atopic dermatitis, mostly caused by food allergens) are on the rise during the last two decades (Wuthrich, 1996). There are no data regarding the prevalence of food allergy among schoolchildren in Lithuania.

The aim of our study was to estimate the prevalence of food allergies among 5th–9th grade schoolchildren.

METHODS

A survey on the prevalence of food allergies was conducted in Vilnius, the capital of Lithuania, in November–December 2005. Vilnius is the biggest city of Lithuania, wherein people of various nationalities with different nutritional habits live.

The expected prevalence of food allergies was 15%, maximum error being 3%. The survey sample size was calculated using EpiInfo Version 6; 540 schoolchildren of 5th–9th grades had to be interrogated for a representative survey. 710 questionnaires were distributed; 540 of them were filled up and found suitable for analysis (response rate 76.1%).

A modified WHO questionnaire with additional questions about consumption of allergy-causing food was used to estimate the prevalence of food allergies among schoolchildren. There were

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28 items in the form, including questions about demographic characteristics; urticaria and atopic dermatitis, symptoms and causes; characteristics of children's lifestyle. In the questionnaire, allergy was defined as an unusual reaction to common materials in the surroundings: food, house dust, microscopic fungi or moulds, pollen, insects' poisons, pet fur, domestic chemicals, medicines, etc. The allergy symptoms were: sneezing, running eyes, eye redness, rash, itch, diarrhoea, abdominal pain, headache, respiratory symptoms. Urticaria is characterised by skin rash, outspread, clear and itchy papulae or swelling with red margins. Atopic dermatitis is an itchy skin rash lasting for weeks, even years. Children usually come in rash on face and on extremities.

The questionnaire was tested by a pilot study. The kappa coefficient was calculated using MedCalc, and its value ranged from 0.57 to 0.84. Upgraded questionnaires were distributed among children.

Data analysis was done using statistical packages EpiData 3.1, SPSS 11.0, WinPepi 1.55. The prevalence of food allergies was expressed in percentage; comparisons were done using Student's t test for continuous variables and the χ^2 test for proportions. Statistical significance $L = 0.05$, $p < 0.05$ was statistically significant.

A survey was carried out after receiving permissions from schoolmasters. Parents were also informed by class mentors. Schoolchildren were informed that the form was anonymous and voluntary.

RESULTS AND DISCUSSION

273 girls (50.6%) and 267 boys (49.4%) have answered the questions. The mean age of respondents was 12.66 years (min. 10 years, max. 16 years, SD 1.429 years).

Table 1. The prevalence of food allergies among schoolchildren in Vilnius

Gender	Food allergy positive	
	%	95% CI
Boys (n = 267)	12.7	8.98–16.98
Girls (n = 273)	13.0	9.20–17.21

$p = 0.1$.

Table 2. Association between food allergies and schoolchildren's age

Age (years)	Boys (%)	Girls (%)	χ^2	p
10	10.0	6.25	–	1.000
11	18.9	18.3	0.000	1.000
12	11.1	10.9	0.000	1.000
13	8.1	13.1	0.381	0.537
14	10.9	10.4	–	1.000
15	16.1	15.8	–	1.000
16	50.0	–	–	0.333

$p = 0.8871$.

Table 3. Subjective estimation of health by schoolchildren

Estimation of state of health	Food allergy positive		Food allergy negative		χ^2	p
	%	95% CI	%	95% CI		
Very good or good	68.1	55.79–78.49	84.8	81.25–87.93	10.59	0.001
Median	24.6	15.05–35.38	13.7	10.69–16.93	4.82	0.028
Bad or very bad	7.2	2.39–14.38	1.5	0.60–2.78	–	0.012

$\chi^2 = 15.722$; $p < 0.001$.

At the time of investigation, 12.8% of schoolchildren suffered from food allergies. Data from the other countries are comparable to our data; e.g., in a French study, the prevalence of food allergies among schoolchildren in Toulouse was 6.7% (Rance et al., 2005). American researchers reported this rate in the USA to be 4% (Sampson, 2004). Finnish findings showed that the prevalence of food allergies in Helsinki region was 19% among children of 1 year age group, 27% – 3 years, 8% – 6 years (Kajossari, 1982). The prevalence of food allergies among boys and girls was similar.

The prevalence of food allergies was independent of the age of schoolchildren (Table 2).

We have noticed that food allergy is influenced by estimation of health. Pupils without food allergies estimated their state of health better (Table 3): 84.8% of pupils without food allergies, estimated their health as very good or good. 68.1% of pupils with food allergies estimated their health similarly. Meantime, 7.2% of pupils with food allergy and 1.5% of pupils without it estimated their health as bad or very bad.

The same dependence was determined when analysing the boys' and girls' opinion about their health: both boys and girls with food allergies estimated their health worse.

There were two times more children with food allergy in families where family members had food allergy, than in families without food allergy. It is known that allergy is a hereditary condition. This has been proven by the discovered allergy genes. So, if parents are allergic, it is possible that children will not avoid the disease (Aas et al., 1997; Boss et al., 1998).

37.7% of children who had food allergy pointed out that there were other family members suffering from food allergy (95% CI = 26.29–49.33); 20% of children without food allergy pointed out that there were other allergic family members ($p = 0.002$).

Clinical data showed that children who have food allergy mostly suffered from skin symptoms, especially recurrent rashes. 50% of children experienced these symptoms. 20% of children that have food allergy suffered from digestive symptoms (spastic abdominal pains, vomit, diarrhoea, lip and palate itch). 20% of them suffered from respiratory symptoms (cough, lung rales, laboured inspiration and expiration) (Young et al., 1994). Our results show the same: 34.8% of children that had food allergy indicated body rashes, 14.5% short breath, 34.8% running and itchy eyes.

Symptoms of allergy were different in the groups of food allergy positive and food allergy negative schoolchildren. The data are presented in Table 4.

The symptoms of the respiratory system and skin prevailed in food allergic schoolchildren rather than in healthy persons (Table 5).

After analysing ailments of boys and girls that had food allergy, we noticed that boys suffered from body rash, cough, run-

Table 4. Distribution of food allergy symptoms among healthy and allergic schoolchildren

Symptoms (troubling now)	Food allergy						χ^2	p
	Allergic n = 69			Non allergic n = 468				
	Abs. number.	%	PI 95%	Abs. number	%	PI 95%		
1. Dyspnea	10	14.5	7.17–23.64	11	2.4	1.18–3.90		<0.001
2. Difficulty of breathing	13	18.8	10.43–28.80	24	5.1	3.31–7.30		
3. Cough	20	29.0	18.69–40.15	92	19.7	16.15–23.37	2.630	0.105
4. Frequent phlegm	7	10.1	4.18–18.22	15	3.2	1.80–4.98		0.015
5. Rhinitis	24	34.8	23.71–46.32	97	20.7	17.14–24.51	6.025	0.014
6. Attacks of sneezing	16	23.2	13.87–33.76	25	5.3	3.49–7.55	24.687	<0.001
7. Eyes itching and tearing	19	27.5	17.46–38.57	31	6.6	4.54–9.04	28.717	
8. Palate itching	6	8.7	3.26–16.33	6	1.3	0.47–2.48		0.002
9. Frequent headaches	23	33.3	22.44–44.79	76	16.2	13.01–19.71	10.576	0.001
10. Gastrointestinal problems	10	14.5	7.17–23.64	30	6.4	4.37–8.80	4.586	0.032
11. Body rashes	24	34.8	23.71–46.32	17	3.6	2.13–5.50	78.393	<0.001
12. Skin itching	15	21.7	12.71–32.12	13	2.8	1.49–4.45		

Table 5. Distribution of symptoms among schoolchildren that indicated food allergy

Symptoms (troubling now)	Food allergy						χ^2	p
	Allergic n = 226			Non allergic n = 307				
	Abs. number	%	PI 95%	Abs. number	%	PI 95%		
1. Dyspnea	37	16.4	11.8–21.46	19	6.2	3.77–9.14	13.292	<0.001
2. Difficulty of breathing	43	19.0	14.13–24.38	30	9.8	6.69–13.33	8.665	0.003
3. Cough	103	45.6	38.96–52.09	129	42.0	36.44–47.58	0.533	0.465
4. Frequent phlegm	26	11.5	7.65–15.96	20	6.5	4.02–9.53	3.502	0.061
5. Rhinitis	96	42.5	35.95–48.97	97	31.6	26.43–36.90	6.210	0.013
6. Attacks of sneezing	50	22.1	16.89–27.75	34	11.1	7.79–14.81	11.152	0.001
7. Eyes itching and tearing	42	18.6	13.73–23.90	29	9.4	6.42–12.95	8.639	0.003
8. Palate itching	15	6.6	3.76–10.22	8	2.6	1.13–4.66	4.194	0.041
9. Frequent headaches	66	29.2	23.36–35.29	58	18.9	14.67–23.45	7.186	0.007
10. Gastrointestinal problems	40	17.7	12.96–22.92	38	12.4	8.91–16.28	2.540	0.111
11. Body rashes	73	32.3	26.25–38.53	17	5.5	3.26–8.35	64.544	<0.001
12. Skin itching	38	16.8	12.18–21.95	7	2.3	0.92–4.22	33.717	

ning and itchy eyes more often than girls, and girls suffered from snuffle and headache more often than boys ($p > 0.05$).

5.8% of schoolchildren with food allergy and 10.1% without it were smoking. Smoking did not influence the presence of allergy symptoms (prevalence risk rate PRR = 0.575; 95% CI 0.21–1.55, $p = 0.361$).

Urticaria and atopic dermatitis were most frequent food allergies. 1.3% of schoolchildren were suffering from urticaria at the time of survey and 4.6% had it before. Boys had this disease two times more often than girls (1.9 and 0.7%, respectively), but the difference was not statistically significant ($p > 0.05$). Epidemiological data show that the prevalence of urticaria among children in Spain was 0.6%, and the disease was more frequent among girls than boys (Gaig et al., 2004). 80% of children who suffered from urticaria indicated itches and 20% skin rashes. There are no more data on the prevalence of urticaria among children in Lithuania.

Most schoolchildren pointed out one possible cause of urticaria.

29.1% of them indicated food as the cause of urticaria. Children suffering from urticaria were mostly allergic to eggs (PRR = 2.035; 95% CI = 0.39–10.62), strawberries (PRR = 4.833;

95% CI = 0.85–27.38), wild strawberries (PRR = 5.524; 95% CI = 0.96–31.92), chocolate (PRR = 1.547; 95% CI = 0.30–7.95), oranges (PRR = 1.841; 95% CI = 0.35–9.55).

Atopic dermatitis is the most frequent food allergy among children. The prevalence of atopic dermatitis among adults did not change during the last five years, but it grew up two times among children in Lithuania. According to epidemiological data, atopic dermatitis was diagnosed in 4% of children; symptoms of it were found among 17% of children (Valiulis et al., 2000; Bojarskas et al., 2000). Our data show that 1.9% of schoolchildren had atopic dermatitis (2.2% of boys and 1.5% of girls, $p > 0.05$).

Atopic dermatitis is a disease with a lot of names, from prurigo to neurodermitis. Differential diagnostics is often complicated, particularly in childhood. There is a lot of different scientific information about the prevalence of atopic dermatitis due to its numerous names and different diagnostic criteria (Aas et al., 1997). The prevalence of atopic dermatitis raised much among children under 7 years according to findings of the intensive investigations of the last years. The prevalence of atopic dermatitis in most countries of Europe is 9% to 24% (Aas et al., 1997; Schultz Larsen, 1993; Braathen, 1991; Schwartz, 1952).

Our data show that most of schoolchildren developed atopic dermatitis at the age of 6.28 ± 4.11 years. Williams and co-authors say that atopic dermatitis persists in 40–50% of babies when they grow up, and the risk of developing later respiratory symptoms is about 40–60% (Schwartz, 1952).

Vilnius schoolchildren with atopic dermatitis, more often suffered from skin xerosis (50% of respondents), prolonged skin itches (50%), red skin rashes (40%).

Those who suffered from atopic dermatitis particularly did not tolerate milk, wild strawberries and nuts ($p < 0.05$). The risk of these foods for developing atopic dermatitis is: milk $PRR = 5.053$; 95% $CI = 2.50-10.19$, $p = 0.015$; wild strawberries $PRR = 10.667$; 95% $CI = 3.05-37.35$, $p = 0.018$; nuts $PRR = 10.667$; 95% $CI = 3.05-37.35$, $p = 0.018$. Researchers say that 80% of children suffering from atopic dermatitis are allergic to food (Boss, 1998). The list of most allergic foods is different in separate countries. Food allergy depends on age, nutritional habits of family and society, although milk, soy, eggs, wheat, nuts and fish are often defined as the main products to cause atopic dermatitis (Sampson, 2004).

CONCLUSIONS

1. The prevalence of food allergies among schoolchildren in Vilnius was 12.8%. 1.3% of respondents indicated symptoms of urticaria and 1.9% of atopic dermatitis. The prevalence of food allergies among boys and girls was similar. The prevalence of food allergies was independent of the age of schoolchildren.

2. There were two times more children who had food allergy in the families where family members had food allergy, than in families without food allergy.

3. Schoolchildren suffering from food allergies estimated their health worse than those who did not have food allergies.

Received 28 November 2007

Accepted 20 December 2007

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Rūta Dubakienė, Genė Šurkienė, Rimantas Stukas,
Jolita Pirmaitytė-Vilesko, Andrius Kavaliūnas

VILNIAUS 5–9 KLASIŲ MOKSLEIVIŲ MAISTO ALERGIJOS

Santrauka

Alerginės ligos – dažnėjantis vaikų sveikatos sutrikimas visame pasaulyje. Maisto alergijų paplitimas tarp Vilniaus pagrindinių mokyklų 5–9 klasių moksleivių vertintas anoniminės anketinės apklausos būdu. Į anketos klausimus atsakė 540 moksleivių. Maisto alergija sirgo 12,8% respondentų. Maisto alergijos paplitimas nepriklausė nuo respondentų lyties ir amžiaus. Respondentai, kurie nesirgo maisto alergija, savo sveikatą vertino geriau nei sergantieji. Šeimose, kuriose buvo alergija sergančių šeimoms narių, vaikų, sergančių vienokia ar kitokia maisto alergija, buvo 2 kartus daugiau, negu šeimose, kuriose nėra tokių asmenų. Sergančiuosius maisto alergija dažniausiai vargino: kūno bėrimas (34,8% respondentų), dusulio priepuoliai (14,5%), akių ašarojimas ir niežėjimas (34,8%). Dilgėline sirgo 1,3% vaikų, atopiniu dermatitu – 1,9%. Dauguma vaikų, sergančių dilgėline, yra alergiški kiaušiniams, braškėms, žemuogėms, šokoladui, apelsinams. Sergantieji atopiniu dermatitu netoleravo pieno, žemuogių, riešutų.

Raktažodžiai: paplitimas, moksleiviai, maisto alergijos, atopinis dermatitas, dilgėlinė