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### *Allergy to house dust mite allergens in school students in 1984–2002*

Mites, especially house dust mites (*Dermatophagoides pteronyssinus*), are the most important source of allergens inside buildings. From the practical point of view, mites can be divided into three groups: 1. living in houses, 2. living in food products magazines and 3. living in soil. Since the 1960's, the great "career" of mites has begun and it has lasted up till now (21). Studies performed by Voorhorst's et al. showed the dependence between allergy to house dust and the presence of mites in it (25). House dust mites allergens are responsible for the majority of cases of allergy in patients with chronic allergic rhinitis and IgE-dependent bronchial asthma (2, 23). They also take part in pathogenesis of atopic dermatitis (8). In some people, they may provoke allergy without clinical symptoms (14). In recent years, a significant increase in allergic diseases prevalence has been observed, especially in children (4, 9, 10, 13, 23). Augmentation of a number of patients with allergies, including allergies to house dust mites, is one of the reasons for this phenomenon. There are no Polish publications about changes over many years in prevalence of allergy to house dust mites allergens in healthy people. This fact was the inspiration to take up a study over this problem.

The essential aim of this study was to estimate the prevalence of positive skin prick tests with house dust mites allergens in school students over 18-years time.

#### MATERIAL AND METHODS

The study was performed among students of the last grades of technical railway school in Lublin, in 1984, 1994 and 2002. In 1984, 445 students were included in the study: 301 males (67.6%) and 144 females (32.4%). The average age of females was  $18.8 \pm 0.4$  and the average age of males –  $19.3 \pm 0.6$ . Ten years later, 318 students were examined: 104 females (32.7%) and 214 males (67.3%). The average age of females was  $16.6 \pm 0.9$ , the average age of males –  $16.4 \pm 0.9$ . In 2002, 214 students took part in the study: 157 males (73.4%) and 57 females (26.6%) and the mean age of males was  $17.9 \pm 0.8$  and  $17.6 \pm 1.7$  in case of females (Table 1). In sum, over 90% of students of chosen years were examined. Allergic skin prick tests (SPT) were performed in all of them. All students were asked to stop taking drugs that could influence the result of the test. Allergens of house dust mites (nr 2801) from so-called "Polish" set of allergens produced by Bencard-Beecham (UK) and 0.1% histamine solution as a positive control and Coca's solution as a negative one were used. Skin prick tests were performed and interpreted by the same nurse, using a standard method – antigens were put on the internal surface of the forearm, with standardized scarificators. Skin reaction was evaluated 20 minutes after application. Two diameters of histamine – and allergen-induced wheals were measured: the longest one and the other, perpendicular to it. Then, the mean diameter of the wheal was evaluated and the size of histamine-induced wheal was compared to the size of allergen-induced one (12, 17). The result was presented in

a "plus" scale (0, /+, /++, /+++, /++++), according to so-called Scandinavian scale of tests evaluating (7). Allergen-induced wheals, equal with histamine-induced ones (+++) or larger than them (++++) were recognized as positive result of the test and only these results were submitted to further statistic analysis (1).

## RESULTS

Table 1. presents demographic data of studied population, including place of living and sex. Among young people examined in 1984, over 82% of females lived in the country and only 17% in the city. In case of males, these percentages were the following: 61.2% (country) and 38.8% (city). In 1994, over 55% of females and 34.1% of males lived in the country and 44.2% of females and 65.9% of males lived in city. In 2002, 47.4% of females and 34.4% of males of studied population lived in the country, whereas 52.6% of females and 65.6% of males lived in city.

Table 1. Demographic data of studied population, including place of living and sex

	1984 n (%)		1994 n (%)		2002 n (%)	
	♀	♂	♀	♂	♀	♂
CITY	25 (17.4)	117 (38.8)	46 (44.2)	141 (65.9)	27 (47.4)	103 (65.6)
COUNTRY	119 (82.6)	184 (61.2)	58 (55.8)	73 (34.1)	30 (52.6)	54 (34.4)
Totally	144 (100.0)	301 (100.0)	104 (100.0)	214 (100.0)	57 (100.0)	157 (100.0)

Figure 1 presents prevalence of positive SPT against studied allergen. The lowest percentage of positive results was obtained in 1984 – only 7%. Statistically significant higher prevalence of positive SPT were found in 1994 – 12% ( $\chi^2 = 6.27$ ,  $p < 0.01$ ). In the group studied in 2002, more of positive results (17.8%), in comparison to 1994 ( $\chi^2 = 4.27$ ,  $p < 0.05$ ) and to 1984 ( $\chi^2 = 15.7$ ,  $p < 0.001$ ) were observed.

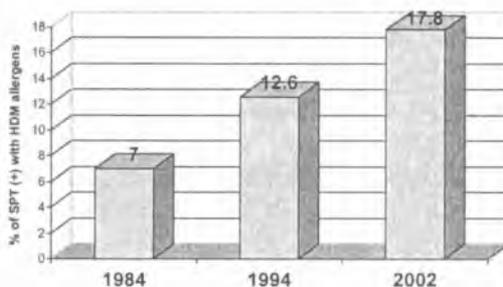


Fig. 1. Percentage of positive skin prick tests [(SPT (+)) with house dust mites (HDM) allergens in studied population in 1984, 1994 and 2002 years

## DISCUSSION

Our study has shown a constant increase of skin hypersensitivity to house dust mites allergens in the examined population of young people. The lowest percentage of positive skin prick tests results was found in 1984 – about 7%. Almost twice as high percentage was observed only after 10 years.

After another 8 years, this percentage was higher again – 17.8%. It proves definitely the existence of a growing tendency concerning the studied phenomenon. Similar percentage of positive SPT against house dust mites allergens (14.0%) in the population close to that analyzed in this study, in respect of age and environment, was observed in 2001 by Śpiewak et al. in students of agricultural schools (22). On the other hand, a lower percentage of positive SPT against house dust mites allergens (7.4%) was found by Kardas-Sobantka (11) in students of secondary schools in Łódź in the 1990's. Higher percentages of positive results were found in the population of Australian children, among whom, at the end of the previous century, over 30% were sensitized to house dust mites allergens and this percentage was higher than 5 years before (6).

Results of our study are parallel to the generally observed tendency of increasing prevalence of IgE-dependent allergies and allergic diseases of respiratory system during the last 30–40 years in developed and developing countries (15, 23). There are also first reports describing no further increase of IgE-dependent allergies and atopic diseases in children and young people in Switzerland (3), Italy (20) and Austria (19). It is well known that people with skin hypersensitivity to aeroallergens, including house dust mites allergens, compose a group with a higher risk of developing allergic diseases, including bronchial asthma (5). This fact is confirmed indirectly by studies performed in Lublin, according to which: 30% of adults suffering from chronic or recurrent diseases of respiratory system and 65–75% of children with allergic diseases of respiratory system are allergic to house dust mites (18). The percentage of people allergic to house dust mites depends on environmental and occupational conditions, which is shown by Taksey et al. in epidemiological studies performed in USA in patients with allergic diseases of respiratory system (24).

To summarize, the percentage of school students with positive skin prick tests against house dust mites allergens has increased over the last 18 years: from 7.0% in 1984 to 17.8% in 2002.

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#### SUMMARY

The aim of the study was to estimate the prevalence of allergy to house dust mites allergens in school students in repeated studies during the last 18 years. 977 students were included in this study: 445 in 1984, 318 in 1994 and 214 in 2002, which makes over 90% of last classes population of students of technical railway school in analyzed years. Skin prick tests against house dust mites antigens, produced by Bencard-Beecham, were performed. Over the last 18 years, a constant increase of percentage of people with positive results (+++ or ++++) of allergic skin tests against house dust mites has been observed: from 7.0% in 1984 to 12.6% in 1994 and 17.8% in 2002.

## Uczulenie na alergeny roztoczy kurzu domowego u młodzieży szkolnej w latach 1984–2002

Celem pracy była ocena częstości uczuleń na alergeny roztoczy kurzu domowego u młodzieży szkolnej w kilkuletnich odstępach czasowych na przestrzeni ostatnich 18 lat. Badaniem objęto 445 osób w roku 1984, 318 w roku 1994 oraz 214 w 2002 roku, co stanowiło ponad 90% populacji klas wyższych Technikum Kolejowego w Lublinie w analizowanych latach. Wykonano punktowe testy skórne z alergenami roztoczy kurzu domowego firmy Bencard-Beecham. Na przestrzeni 18 lat zaobserwowano stały wzrost odsetka badanej populacji z dodatnimi wynikami alergicznych testów skórnych (+++ lub ++++) z alergenami roztoczy kurzu domowego: od 7,0% w roku 1984 do 12,6% w roku 1994 oraz 17,8% w roku 2002.