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ATOPY, ALLERGIC DISEASES AND WORK-RELATED SYMPTOMS AMONG STUDENTS OF AGRICULTURAL SCHOOLS: FIRST RESULTS OF THE LUBLIN STUDY*

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Abstract: 136 eastern-Polish farming students (51 females and 85 males, aged 16–23 years) underwent clinical examination, skin prick tests with common and farm-specific allergens, total IgE measurement and Phadiatop test. Atopy was found in 35.3% (95% CI: 27.3–43.3%) of students. For allergic skin diseases, the point prevalence was 5.9%, the lifetime prevalence 28.7%; for allergic rhinitis 12.7% and 16.4%; for asthma 2.2% and 8.8% respectively. 56 students (41.2%) complained of work-related symptoms; most often of pruritus (30.9%), erythema of the skin (16.9%), sneezing (16.2%), rhinorrhea (15.4%), cough (9.6%) and dyspnea (8.1%). The students reported as causative factors of work-related symptoms: grain dust (71.4% of the 56 symptomatic students), hay dust (57.1%), straw dust (17.9%), green parts of plants (5.4%), fertilisers, diesel fuel and farm animals (3.6% each). Prick tests were positive in 30.9% of students, most frequently to *Lepidoglyphus destructor* (18.4% of all students), *Tyrophagus putrescentiae* (15.4%), *Dermatophagoides pteronyssinus* (14.0%), *Acarus siro* (13.2%) and weed pollens (5.1%). The only statistically significant difference between males and females found in the study was that in the lifetime prevalence of allergic skin diseases (males 17.6% *versus* females 47.1%, $p < 0.001$). Students reporting work-related symptoms had significantly more present and past allergic skin diseases and allergic rhinitis (for each feature $p < 0.01$), and past obstructive lung disease ($p = 0.001$). In 12 farming students (8.8%, 95% CI: 4.1–13.6%), employment as a farmer was strongly contraindicated due to health status.

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Key words: young farmers, farming students, atopy, allergic diseases, work-related symptoms, occupational disease risk factors, cross-sectional study, epidemiology, eastern Poland, Lublin Study.

INTRODUCTION

The farm is a work place with a heavy exposure to allergens and immunotoxicants (reviewed in [3, 9, 11, 12, 14]). Therefore, farming belongs to occupations with highest risk for developing occupational allergy of skin and airways [18]. It has been shown that sensitisation to farm allergens can take place already during the early years of farm working [17]. On the other hand, results of recent studies suggest that being born and raised on a

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Table 1. Basic demographic data on the study area, numbers of examined farming students and localisation of the agricultural schools in which the study was carried out.

Province*	Population [4]	No. of insured farmers [6]	No. of students tested	Location of agricultural schools included
Lubelskie	2,234,900	166,420	55	Bełżyce (near Lublin) Korolówka (near Włodawa)
Podlaskie	1,222,700	101,670	31	Czartajew (near Siemiatycze)
Podkarpackie	2,126,000	74,133	26	Nienadowa (near Dubiecko)
Świętokrzyskie	1,322,800	71,362	24	Chęciny (near Kielce)

* Poland is divided into 16 provinces (Voivodships), each with 1–5 million inhabitants.

farm protects against developing an allergic disease [1, 2, 10, 13, 28]. This contradiction raises the question about the real impact of farm environment on the health of young farmers, who mostly originate from farmers' families. The aim of this study was to describe the prevalence of atopy and allergic diseases, risk factors and frequency of work-related symptoms among farming students.

MATERIALS AND METHODS

Study design. In May 2001, a cross-sectional study was carried out in five agricultural schools located in four eastern-Polish provinces (Lubelskie, Podlaskie, Podkarpackie and Świętokrzyskie) which are characterised by relatively large numbers of private farms. In order to achieve a good coverage of this area, the distance between schools selected for the study was always greater than 100 km. The study was based on a physician-administered questionnaire, specialist medical examinations, skin prick tests and *in vitro* allergy testing.

Study group. Altogether, 136 farming students were involved in the study: 51 females and 85 males, aged 16–23 (median 19) years. Of these, 119 (87.5%) were born and raised on family farms. The remaining 17 students had also been regularly exposed to a farm environment through working on farms belonging to close relatives and during practical lessons in the school. The numbers of students in tested groups were proportional to the numbers of private farmers in each province (Tab. 1). In each school, consecutive students were selected from alphabetic lists of the farming classes until the necessary number of persons had been reached. The students were informed about the procedures and possible risks and signed a consent to participate in the study.

Medical examinations. Every student was examined by a dermatologist, ENT-specialist and internist. Each physician collected the medical history and subsequently carried out the medical examinations according to his/her respective specialty. The questionnaire used for the study included questions about work-related exposures on the farm, past and present allergic diseases, and work-related symptoms. Besides the standard medical examinations, skin prick tests, anterior and posterior rhinoscopy and spirometry (Lungtest 250, MES Poland) were carried out in every student, as well as determination of the total IgE level and Phadiatop test (UniCAP 100, Pharmacia Sweden). The students were classified as atopic if at least one of the following criteria was fulfilled: 1) positive Phadiatop test, 2) total IgE above 120 kU/l and at least one positive reaction on skin prick tests, or 3) three or more positive reactions on skin prick tests.

Skin prick tests were carried out both with common and farm-specific allergens. The common allergens used for testing were house dust mite *Dermatophagoides pteronyssinus*, animal dander mix I (dog, cat, rabbit, golden hamster, guinea pig), grass/cereals pollen mix (*Holcus lanatus, Dactylis glomerata, Lolium perenne, Phleum pratense, Poa pratensis, Festuca pratensis, Hordeum vulgare, Avena sativa, Secale cereale, Triticum sativum*), tree pollen mix I (*Alnus glutinosa, Corylus avellana, Populus* sp., *Ulmus scabra, Salix caprea*), tree pollen mix II *(Betula alba, Fagus silvatica, Quercus robur, Platanus orientalis*), weed pollen mix (*Artemisia vulgaris, Urtica dioica, Taraxacum vulgare, Plantago lanceolata*). All the above allergens were produced by Allergopharma, Germany. The farm work-specific allergens included storage mites *Acarus siro*, *Lepidoglyphus destructor*, *Tyrophagus putrescentiae*, hay dust, cow epithelium, pig epithelium, and horse epithelium (Allergopharma, Germany), as well as grain dust, straw dust, and hay dust (Biomed, Poland). The skin prick test was carried out on the anterior forearm surface using standard lancets (Allergopharma, Germany). The test site was observed after 20 minutes and the size of the wheal reaction recorded. Wheals equal to or exceeding half the diameter of the control wheal elicited by histamine solution (1 mg/ml) were regarded as a positive test result.

Statistical analysis. The fractions of students having respective symptoms are presented as percents. 95% confidence intervals (95% CI) was calculated for these fractions. Point prevalence (frequency of diseases present at the time of medical examination) and lifetime prevalence (disease symptoms reported in the medical history) were calculated for allergic diseases. For work-related symptoms, only lifetime prevalence was calculated, as none of the students had had this kind of

Table 2. Atopy traits among 136 farming students.

Criterion	No. of students	%	95% CI
At least 1 prick test positive	42	30.9%	23.1–38.6%
At least 2 prick tests positive	28	20.6%	13.8–27.4%
At least 3 prick tests positive	24	17.6%	11.2–24.0%
Total IgE > 120 kU/l	47	34.6%	26.6–42.5%
Phadiatop positive	44	32.3%	24.5–40.2%
Atopy*	48	35.3%	27.3–43.3%

* In this study a person was considered atopic if at least one of the following criteria was fulfilled: 1) positive Phadiatop test, 2) total IgE above 120 kU/l and at least one positive reaction on skin prick tests, or 3) three or more positive reactions on skin prick tests.

symptom at the time of the study. The percentage of students with a health status causing disability to work on the farm was also calculated. The following variables were tested for possible differences between females and males: Phadiatop test results, elevated IgE level, prick test reactions, presence of atopy, allergic diseases of the skin, upper and lower airway (both at the time of examination and in the past), as well as work-related symptoms. Similarly, differences between students having work-related symptoms and their asymptomatic classmates have been looked for. Chi-square test was used for testing the significance of the differences.

RESULTS

Atopy: Phadiatop, total IgE and skin prick tests (Tab. 2). Positive Phadiatop results were recorded in 44 students (32.4%), and an elevated total IgE (> 120 kU/l) was found in sera of 47 students (34.6%). On skin prick tests, at least one positive reaction was found in 42 students (30.9%). The allergens most frequently causing positive skin reactions were storage mites *L. destructor* and *T. putrescentiae*, followed by *D. pteronyssinus*, *A. siro* and weed pollens. Table 3 shows detailed results of skin prick tests. Altogether, 48 students (35.3%, 95% CI: 27.3–43.3%) were classified as atopic according to the above criteria.

Allergic diseases in the study population (Tab. 4). Allergic diseases of the skin at the time of medical examination (point prevalence) were found in eight students (5.9%, 95% CI: 1.9–9.8%), atopic dermatitis diagnosed in four, allergic contact dermatitis in three, and irritant contact dermatitis in one student. A history of allergic skin disease was given by 39 students (28.7%, 95% CI: 21.1–36.3%; this number includes also those with present symptoms). Based on the history, allergic contact dermatitis was diagnosed in 24, atopic dermatitis in five, irritant contact dermatitis in five, and urticaria also in five students. Details are shown in Table 4.

For unknown reasons, two students of the group did not undergo the ENT examination, which was noticed only during the data evaluation. Among the remaining 134 students, allergic diseases of the upper airways at the

Table 3. Results of skin prick tests among 136 farming students.

Exposure	Allergen (Producer)	n	%	95% CI
Ubiquitous	*Dermatophagoides pteronyssinus* (Allergopharma)	19	14.0%	8.1–19.8%
	Weed pollen (Allergopharma)	7	5.1%	1.4–8.9%
	Tree pollen II (Allergopharma)	5	3.7%	0.5–6.8%
	Grass/cereals pollen (Allergopharma)	5	3.7%	0.5–6.8%
	Animal dander I (Allergopharma)	4	2.9%	0.1–5.8%
	Tree pollen I (Allergopharma)	3	2.2%	0.0–4.7%
Farm work-related	*Lepidoglyphus destructor* (Allergopharma)	25	18.4%	11.9–24.9%
	Tyrophagus putrescentiae (Allergopharma)	21	15.4%	9.4–21.5%
	Acarus siro (Allergopharma)	18	13.2%	7.5–18.9%
	Grain dust (Biomed)	7	5.1%	1.4–8.9%
	Straw dust (Biomed)	5	3.7%	0.5–6.8%
	Hay dust (Allergopharma)	5	3.7%	0.5–6.8%
	Hay dust (Biomed)	3	2.2%	0.0–4.7%
	Cow epithelium (Allergopharma)	1	0.7%	0.0–2.2%
	Pig epithelium (Allergopharma)	0	0%	–
	Horse epithelium (Allergopharma)	0	0%	–

Table 4. Allergic diseases among 136 farming students in eastern Poland.

Organ	Disease	Present on examination (Point prevalence)			History of the disease (Lifetime prevalence)		
		N	%	95% CI	N	%	95% CI
Skin	Atopic dermatitis	4	2.9%	0.1–5.8%	5	3.7%	0.5–6.8%
	Allergic contact dermatitis	3	2.2%	0.0–4.7%	24	17.6%	11.2–24.0%
	Irritant contact dermatitis	1	0.7%	0.0–2.2%	5	3.7%	0.5–6.8%
	Urticaria	0	0	–	5	3.7%	0.5–6.8%
	Total	**8**	**5.9%**	**1.9–9.8%**	**39**	**28.7%**	**21.0–36.3%**
Nose*	Perennial allergic rhinitis*	12	9.0%	4.1–13.8%	14	10.4	5.3–15.6%
	Seasonal allergic rhinitis*	5	3.7%	0.5–6.9%	8	6.0%	2.0–10.0%
	Total *	**17**	**12.7%**	**7.0–18.3%**	**22**	**16.4%**	**10.1–22.7%**
Lung	Asthma	3	2.2%	0.0–4.7%	12	8.8%	4.1–13.6%
	Bronchial hyperreactivity**	0	0	–	15	11.0%	5.8–16.3%
	Total	**3**	**2.2%**	**0.0–4.7%**	**27**	**19.8%**	**13.1–26.6%**

N – number of students with diagnosed disease, % - fraction of those students; 95% CI – 95% confidence interval for the fraction; * The ENT examination was carried out in 134 students; ** 15 students reported past symptoms of bronchial hyperreactivity which could not be assigned to any specific lung disease based only on medical history.

moment of examination was found in 17 students (point prevalence 12.7%, 95% CI: 7.0–18.3%). Perennial allergic rhinitis was found in 12, and seasonal allergic rhinitis in five students. Symptoms of allergic diseases of the upper airways in the past (lifetime prevalence) was reported by 22 students, including all those with present symptoms (16.4%, 95% CI: 10.1–22.7%); perennial allergic rhinitis was diagnosed in 14, and seasonal allergic rhinitis in eight students (Tab. 4).

Table 5. Skin and respiratory symptoms provoked by farm work as reported by 136 farming students (lifetime prevalence).

Organ	Symptoms	N	%	95% CI
Skin	Pruritus	42	30.9%	23.1–38.6%
	Erythema	23	16.9%	10.6–23.2%
	Papular rash	10	7.4%	3.0–11.7%
	Wheals	9	6.6%	2.4–10.8%
	Vesicles	2	1.5%	0.0–3.5%
Nose	Sneezing	22	16.2%	10.0–22.4%
	Rhinorrhea	21	15.4%	9.4–21.5%
	Nasal blockage	3	2.2%	0.0–4.7%
Lung	Cough	13	9.6%	4.6–14.5%
	Dyspnea	11	8.1%	3.5–12.7%
	Wheezing	2	1.5%	0.0–4.1%
Total (any work-related symptom present)		56	41.2%	32.9–49.4%

N – number of students complaining of the respective symptom, % - fraction of those students; 95% CI – 95% confidence interval for the fraction.

At the time of the study, asthma was diagnosed in three students (point prevalence 2.2%; 95% CI: 0.0–4.7%). A history of past lung problems was given by 27 students, including the three mentioned previously (lifetime prevalence 19.8%, 95% CI: 13.1–26.6%). Symptoms typical for bronchial asthma were reported by 12 students, a further 15 students reported symptoms of bronchial hyperreactivity which could not be assigned to any specific lung disease based only on medical history (Tab. 4).

Overall assessment of the students' health status was issued by the participating physicians based on medical examination results, skin prick tests and laboratory results. There were no health objectives in 77 students (56.6%, 95% CI: 48.3–64.9%). Periodic health checks due to presence of various symptoms were advised to 47 students (34.6%, 95% CI: 26.6–42.5%). Twelve students (8.8%, 95% CI: 4.1–13.6%) were strongly advised to change their vocational education and look for employment outside farming because they had already had serious allergic diseases, caused or clearly aggravated by farm work.

Work-related symptoms and provoking factors (Tab. 5 and 6). To the question "have you ever experienced health problems provoked by work on the farm?", the answer "yes" was given by 56 students (41.2%, 95% CI: 32.9–49.4%). Detailed information on work-related symptoms is shown in Table 5. The students complained mostly of work-related pruritus (30.9%), skin erythema (16.9%), sneezing (16.2%), rhinorrhea (15.4%), cough (9.6%) and dyspnea (8.1%). The reported causative factors for work-related symptoms were: grain dust (indicated by 71.4% of the 56 symptomatic students), hay

Table 6. Provoking factors as reported by the 56 students complaining of work-related symptoms.

Provoking factor/situation	N	%
Grain dust	40	71.4%
Hay dust	32	57.1%
Straw dust	10	17.9%
Green parts of plants	3	5.4%
Spreading fertilisers	2	3.6%
Contact with diesel fuel	2	3.6%
Working in cow barn	1	1.8%
Working in pigsty	1	1.8%

N – number of students reporting respective factor/situation as provoking their symptoms, % - fraction of the 56 students with work-related symptoms.

dust (57.1%), straw dust (17.9%), green parts of plants (5.4%), fertilisers, diesel fuel and farm animals (3.6% each). More detailed information on provoking factors is shown in Table 6.

Differences between gender groups (Tab. 7). No statistically significant differences between females and males was found regarding the following variables: Phadiatop test results, elevated IgE level, skin prick test reactions, presence of atopy, allergic diseases of the upper and lower airway (both at the time of examination and in the past), and work-related symptoms. There were no significant differences regarding present allergic skin diseases either. The only significant difference ($p < 0.001$) was that female students more often reported allergic skin diseases in the past (47.1%) as compared to the males (17.6%).

Differences between students who have had work-related symptoms and their asymptomatic classmates (Tab. 8). Positive Phadiatop test results, elevated total IgE levels, positive skin prick tests and atopy were more frequent among those students who have had work-related symptoms, these differences, however, were not statistically significant. Instead, having work-related symptoms was strongly associated with having an allergic skin disease or allergic rhinitis, either at the time of examination or in the past. This coincidence was also observed with respect to having a history of pulmonary diseases (including asthma and other unspecified kinds of bronchial hyperreactivity). In our group, there was no such association regarding the point prevalence of lung diseases.

DISCUSSION

Among the farming students involved in our study, 35.3% were atopic. In a similar group of farming students in Austria, Prior and colleagues [17] found a higher atopy prevalence rate of 49.7%. A higher prevalence of atopy (50.0%) has also been found among Norwegian schoolchildren [8]. On the other hand, our results are comparable to those found by Wüthrich and colleagues [30] in Swiss adults: 32.3% of their study population was classified as atopic. Phadiatop test was positive in 28.9% of Swiss adults (compared to 32.3% in our study), at least one positive skin prick test was found in 23.0% of the Swiss (30.9% in our study). The prevalence of atopy in our group was also similar to figures found in early 1990s by von Mutius and colleagues [29] in West Germany (36.7%), much higher than in East Germany (18.2%). In fact, we expected lower rates, as our study population lived in rural areas of the less developed, eastern part of Poland. It is widely accepted that having lived on a farm in childhood prevents the development of allergies [10,

Table 7. Analysis of differences between the gender groups.

	Total (136)		Females (51)		Males (85)		P
	N	%	N	%	N	%	
Positive Phadiatop	44	32.3%	14	27.5%	30	35.3%	ns
Elevated IgE	47	34.6%	19	37.2%	28	32.9%	ns
At least 1 skin prick test positive	42	30.9%	11	21.6%	31	36.5%	ns
Atopy*	48	35.3%	14	27.5%	34	40.0%	ns
Skin disease – point prevalence	8	5.9%	2	3.9%	6	7.1%	ns
Skin disease – lifetime prevalence	39	28.7%	24	47.1%	15	17.6%	$p < 0.001$
Nose disease – point prevalence**	17	12.7%**	7	13.7%	10	12.0%**	ns
Nose disease – lifetime prevalence**	22	16.4%**	9	17.6%	13	15.7%**	ns
Lung disease – point prevalence	3	2.2%	1	2.0%	2	2.4%	ns
Lung disease – lifetime prevalence	27	19.9%	14	27.5%	13	15.3%	ns
Work-related symptoms	56	41.2%	17	33.3%	39	45.9%	ns

* See comment to the Table 2; ** As 2 male students did not undergo the ENT-examination, the prevalence ratios for allergic diseases of the nose were calculated for the total of 134 students and for 83 male students.

Table 8. Analysis of differences between the students with work-related symptoms and their asymptomatic classmates.

	Total (136)		Symptomatic (56)		Asymptomatic (80)		P
	N	%	N	%	N	%	ns
Positive Phadiatop	44	32.3%	22	39.3%	22	27.5%	ns
Elevated IgE	47	34.6%	24	42.9%	23	28.7%	ns
At least one skin prick test positive	42	30.9%	20	35.7%	22	27.5%	ns
Atopy*	48	35.3%	24	42.9%	24	30.0%	ns
Skin disease – point prevalence	8	5.9%	7	12.5%	1	1.2%	p = 0.006
Skin disease – lifetime prevalence	39	28.7%	24	42.9%	15	18.7%	p = 0.003
Nose disease – point prevalence**	17	12.5%**	12	22.2%**	5	6.2%	p = 0.007
Nose disease – lifetime prevalence**	22	16.2%**	15	27.8%**	7	8.7%	p = 0.004
Lung disease – point prevalence	3	2.2%	2	3.6%	1	1.2%	ns
Lung disease – lifetime prevalence	27	19.9%	19	33.9%	8	10.0%	p = 0.001
Male gender	85	62.5%	39	69.6%	46	57.5%	ns

* See comment to Table 2; ** As two students who reported work-related symptoms did not attend the ENT-examination, the prevalence ratios for allergic diseases of the nose were calculated for the total of 134 students and for 54 symptomatic students.

13, 28]. However, the actual protective factor has not yet been identified, neither among environmental [2] nor economical [22] factors.

In our group, the farm-specific allergens appeared to be of higher importance than ubiquitous allergens. The most common sensitisers were storage mites *L. destructor* and *T. putrescentiae*, with a higher sensitisation rate than the house dust mite *D. pteronyssinus*. Storage mites have long been recognised as one of the most important allergen sources in farming [5, 14, 27].

At the time of medical examination, allergic rhinitis (both perennial and seasonal) was the most prevalent allergic disease with the point prevalence of 12.7%, followed by allergic skin diseases (5.9%) and asthma (2.2%). In the medical histories, symptoms of allergic skin diseases were most frequently reported (lifetime prevalence 28.7%), followed by allergic rhinitis (16.4%) and asthma (8.8%). A history of bronchial hyperreactivity (including asthma) was found in 19.8% of students. Different rates have been found in Canadian adolescents raised on farms, where the lifetime prevalence of rhinitis was 30.2%, dermatitis 11.3% and asthma 5.8% [10]. In a study of Austrian children living on farms, Riedler and co-workers found a lower lifetime prevalence of dermatitis, allergic rhinitis, and asthma – 11.4%, 3.1%, and 1.1%, respectively [19]. In Danish children aged from 12–16 years, the point prevalence of atopic dermatitis was 3.6% [15] compared to 2.9% in our study; the lifetime prevalence of asthma – 6.9% (8.8% in our group) and of rhinitis – 15.7% (*versus* 16.4%). The only big difference between both groups was in the lifetime prevalence rates of atopic dermatitis (21.3% in Danish *versus* 3.7% in our group) – probably a result of different definitions and questions asked. In general, the possibility of comparing data from different studies is very limited because of the different definitions and criteria used.

Among work-related symptoms reported by the farming students, pruritus and erythema ("skin redness") were most often mentioned, followed by sneezing, rhinorrhea ("runny nose"), cough and dyspnea. With respect to the comparatively rare occurrence of work-related lung symptoms observed in our study population, it is noteworthy that Omland *et al.* [16] in a study of 1,901 Danish farming students did not find a significant relationship between occupational exposure and lung symptoms.

Agricultural dusts seem to be the most potent factors provoking work-related symptoms. This is in concordance with a previous questionnaire-based study of 145 Polish farmers, among whom skin symptoms related to plant dusts exposure were reported by 35 (24.1%) compared to only two farmers (1.4%) who indicated contact with animals, and one (0.7%) who reported pesticide exposure as a provoking factor [23]. In another study [26], skin symptoms caused by contact with plant material were found in 14 out of 73 (19.2%) of eastern-Polish farmers growing hops and other crops. In the present study, working with animals as a possible provoking factor for work-related symptoms was mentioned only by two students, which confirms previous observations that animal substances rather rarely cause work-related health problems in Central-European farmers [14, 24, 25].

Twelve students (8.8%) were advised to change their vocational education and look for employment outside farming because they have already had serious allergic diseases, caused or clearly aggravated by farm work. In other words, almost every tenth student should never have started farming education because of health objectives. This suggests that the prophylactic health check procedures used in Polish agricultural schools are insufficient and need careful revision. On the other hand, this type of health evaluation should comprise only

relevant questions and tests in order to avoid unjustified discrimination of candidates [7]. An example of the difficulties in designing an appropriate health check procedure is the question of whether atopy is a risk factor for occupational diseases [20, 21]. In our study, all atopy traits (positive skin prick tests, elevated IgE, positive Phadiatop) were more frequent among students with work-related symptoms; however, these differences were not statistically significant. Therefore, the role of these atopy tests for the pre-school and pre-emloyment medical assessment seems to be of secondary importance. Our results suggest that the medical history should focus on present and past allergic diseases. We hope to identify further points of importance for the decisive process after having evaluated data from a bigger population of agricultural students. The Lublin Study will continue in the remaining parts of Poland in 2002.

CONCLUSIONS

- The prevalence rate of atopy in eastern-Polish farming students (87.5% of whom were born and raised on family farms) is 35.3%; storage mites are the most important sensitisers in this group.
- The point prevalence of allergic rhinitis, allergic skin diseases and asthma in eastern-Polish farming students is 12.7%, 5.9% and 2.2%, respectively.
- Students with work-related symptoms have significantly more present and past allergic skin diseases and allergic rhinitis, as well as past obstructive lung disease.
- Every third farming student complains of work-related symptoms, and every tenth should not undertake work as a farmer due to his/her health status.

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