

SHORT COMMUNICATION  
UDC 616-056.3:613.63PREVALENCE OF  
SENSITIZATION TO  
*DERMATOPHAGOIDES*  
*PTERONYSSINUS* IN  
SEVERAL INDUSTRIAL  
POPULATIONSJELENA MACAN AND  
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Skin tests with *Dermatophagoides pteronyssinus* were carried out by the standard prick method in six groups of industrial workers: meat processing workers (n=107), brewery workers (n=96), animal food workers (n=40), swine farmers (n=32), paper-mill workers (n=132) and wool-textile workers (n=111). The control group consisted of 158 subjects who were tested during the preemployment examinations and had not worked in industrial plants before. Skin reactions were read after 20 minutes by measuring the largest urtica diameter in millimeters. A diameter >3 mm was considered to be a sign of a positive skin reaction. In relation to the control group a significant (P<0.01) higher prevalence of positive skin reaction to *D. pteronyssinus* was found among the meat processing workers (41 vs. 13%), animal food workers (30 vs. 13%), swine farmers (34 vs. 13%) and wool-textile workers (32 vs. 13%). Results of the standard prick test were not significant for the brewery workers (21 vs. 13%) and the paper-mill workers (21 vs. 13% in controls). Our results demonstrate the need for applying specific individual health measures if working conditions favour the growth and reproduction of house dust mites.

*Key terms:*  
allergy, house-dust mites, occupational environment, skin  
prick test

The house-dust mite has been known for 20 years to be the main source of the allergen in house dust, and consequently one of the main causes of sensitization and occurrence of allergic respiratory diseases, particularly bronchial asthma. *D. pteronyssinus* is the most frequent house-dust mite. Recently, several families and species of the mite have been identified as possible ubiquitous inhalatory allergens (Table 1). Epidemiological investigations in the general popu-

lation have shown a world-wide increase in *D. pteronyssinus* sensitization (1, 2). So far an indisputable link between the number of dust mites in the environment and the occurrence of sensitization of the respiratory mucous membrane and allergic diseases of the respiratory system has been established. By reducing the mites in the environment the incidence of sensitized persons and the intensity of their disorders are reduced (3, 4). An international group of scientists, under the auspices of the International Association of Allergology and Immunology and World Health Organization, has proposed the following categorization levels of the health risk of mite allergic patients: 1. more than 2 mg of a major allergen (Der p I) per gram of dust - increased risk of sensitization and development of IgE mediated allergy towards the house dust mite. 2. more than 10 mg (Der p I) per gram of dust - increased risk of the development of acute allergy in already sensitized mite allergic patients (5). In this study sensitization to *D. pteronyssinus* was investigated in several industrial populations in this country.

Table 1 House-dust mites

Family	Genera	Species
Pyroglyphidae	<i>Dermatophagoides</i>	<i>D. pteronyssinus</i> <i>D. farinae</i>
	<i>Euroglyphus</i>	<i>E. maynei</i>
	<i>Hirstia</i>	
	<i>Malayoglyphus</i>	
	<i>Pyroglyphus</i>	
	<i>Sturnophagoides</i>	
Glycyphagidae	<i>Glycyphagus</i>	<i>G. domesticus</i>
	<i>Lepidoglyphus</i>	<i>L. destructor</i>
	<i>Blomia</i>	<i>B. tropicalis</i> <i>B. kulagini</i>
Acaridae	<i>Acarus</i>	<i>A. siro</i> <i>A. farris</i>
	<i>Tyrophagus</i>	<i>T. putrescentiae</i> <i>T. longior</i>

## SUBJECTS AND METHODS

### Subjects

The study included six groups of workers employed in various industries: meat processing workers (n=107), brewery workers (n=96), animal food workers (n=40), swine farmers (n=32), paper-mill workers (n=132) and wool-textile workers (n=111). The control group consisted of 158 subjects who were tested during the previous

preemployment examinations and who had not worked in industrial plants previously.

### Skin testing

Skin prick test with *D. pteronyssinus* (0.2%) was performed by a standard method (6) The allergen extract was prepared in the Institute of Immunology, Zagreb. The result of the skin prick test was read 20 minutes after testing, and an urtica of 3 mm diameter or more was considered to be a positive reaction. All subjects were tested with histamine hydrochloride (1 mg/ml) and buffer solution as control of negative and positive skin reactions. Differences between the percentages of subjects with positive reactions to the skin prick test were assessed by means of the chi-squared test.

## RESULTS

Results are presented in Table 2. In relation to the controls, a significant ( $P < 0.01$ ) higher prevalence of workers with positive skin prick test to *D. pteronyssinus* was found among the meat processing workers (41 vs. 13%), animal food workers (30 vs. 13%), swine farmers (34 vs. 13%) and wool-textile workers (32 vs. 13%). The prevalence was not significant in brewery workers (21 vs. 13%) and paper-mill workers (21 vs. 13%).

Table 2 Prick test positive subjects to *Dermatophagoides pteronyssinus*

Groups	Total n	Mean age (y)	Mean exposure (y)	Prick +		P
				n	%	
Control (general population)	158	26	0	20	13	
Meat processing workers	107	36	10	44	41	$P < 0.001$
Animal food workers	40	40	14	12	30	$P < 0.01$
Swine farmers	32	35	8	11	34	$P < 0.001$
Wool-textile workers	111	38	16	36	32	$P < 0.001$
Brewery workers	96	40	18	20	21	n.s.
Paper-mill workers	132	41	16	27	21	n.s.

n.s. not significant

## DISCUSSION AND CONCLUSIONS

The prevalence of *D. pteronyssinus* sensitization was correlated to the number of mites in the environment, which in the general population in regions with moderate climate, ranges from 5 to 30%. Such a region is characterized by a significant decrease in the number of mites in the environment in areas at higher altitudes (2, 7, 8). In tropical areas the prevalence of sensitization to *D. pteronyssinus* in the general population is much higher and ranges from 30 to 50%. This corroborates the finding of an even greater number of mites in the environment the nearer one is to the equator. In tropical regions even at high altitudes (above 2000 m) the number of mites remains high (9-11). The prevalence of *D. pteronyssinus* sensitization among asthmatics is significantly higher than in the general population and ranges between 45 and 85% in moderate climate (2) and is as high as 95% in tropical regions (11). The results of our investigation show that the prevalence of *D. pteronyssinus* sensitization in the general population is 13%. This is in agreement with the above data for a moderate climate region. The reasons for these differences in sensitization should primarily be looked for in the physiology of the house dust mite, whose growth and reproductive ability depend on ambient conditions, and are optimal at temperatures between 20 and 30° C and relative humidity above 60%. The greater importance of air humidity over temperature should be emphasized. It has been demonstrated that a decrease in the number of mites occurs in dry conditions (relative humidity below 50%), heating and good ventilation (1, 12, 13).

Our data indicate a significantly higher prevalence of *D. pteronyssinus* sensitization in certain industries, where microclimate in the working environment most likely favours the growth and reproduction of mites. For example, in the meat processing industry (high humidity and relatively low temperatures) the prevalence of sensitization to *D. pteronyssinus* is 41%, which compares to the level of sensitization in the general population of tropical areas. The data show that the number of mites in such a working environment is considerably greater than in non-industrial areas in a region with moderate climate.

A high prevalence of *D. pteronyssinus* sensitization can play a role in the aetiology of health disorders among workers, particularly those of the respiratory system. In spite of the fact that *D. pteronyssinus* is an ubiquitous inhalatory allergen, its presence in the working environment can be much greater than in home conditions. This leads to marked deterioration of respiratory disorders at the workplace in already sensitized persons, or to increased incidence of such persons. This problem is frequently overlooked during preemployment and systematic, periodic examinations of workers (14).

In conclusion, for the prevention of allergic diseases of the respiratory system, it is necessary to control the number of house-dust mites in the working environment, and to detect allergic workers by standard prick skin test, particularly if ambient conditions favour the reproduction of mites.

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### Sažetak

## PREVALENCIJA SENZIBILIZACIJE NA *DERMATOPHAGOIDES PTERONYSSINUS* MEĐU INDUSTRIJSKIM RADNICIMA

Ispitana je prevalencija senzibilizacije na *Dermatophagoides pteronyssinus* u skupinama radnika zaposlenih u različitim industrijama. Kožno testiranje prick metodom učinjeno je na standardni način alergenskim pripravkom Imunološkog zavoda u Zagrebu (0,2%). Ispitivanje je provedeno u šest skupina radnika: iz mesne industrije – obrade peradi (n=107), proizvodnje piva (n=96), tvornice stočne hrane (n=40), svinjogojske farme (n=32), prerade papira (n=132) i iz tekstilne industrije (n=111). Kontrolna skupina sastojala se od 158 ispitanika koji su testirani tijekom

prethodnih pregleda i koji nisu do tada radili u industrijskim pogonima. U odnosu prema kontrolnoj skupini dobivene su značajne razlike ( $P < 0,01$ ) u prevalenciji pozitivnih kožnih reakcija na *Dermatophagoides pteronyssinus* u mesnoj industriji (41:13%), tvornici stočne hrane (30:13%), svinjogojskoj farmi (34:13%) i u tekstilnoj industriji (32:13%). Kožne reakcije nisu bile značajne u proizvodnji piva (21:13%) i u preradi papira (21:13%). Dobiveni rezultati pokazali su značajno veću prevalenciju senzibilizacije na ovu grinju u mesnoj i tekstilnoj industriji u odnosu na opću populaciju. Rezultati pokazuju značenje prašinskih grinja u etiologiji zdravstvenih tegoba, u prvom redu dišnog sustava zaposlenih, i upućuju na potrebu provođenja specifičnih individualnih zdravstvenih mjera u zaposlenih, kao i u njihovom radnom okolišu.

*Ključne riječi:*

alergija, kožni prick test, prašinske grinje, radni okoliš

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