

ORIGINAL PAPERS

OCCUPATIONAL SKIN DISEASES AMONG THE NURSES IN THE REGION OF ŁÓDŹ

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Abstract. We examined 223 nurses from the Łódź region, referred to the Nofer Institute of Occupational Medicine in 1995–99 because of suspected occupational dermatoses. The diagnosis of contact allergy was based on the positive results of patch tests, and immediate allergy to common allergens and latex on the results of prick tests, as well as on the determinations of specific IgE antibodies.

Contact allergy was diagnosed in 66.4% of nurses. The most frequent sensitisers were quaternary ammonium compounds (benzalkonium) (23.8%), nickel (21.5%) and formaldehyde (20.6%); allergy was somewhat less frequently caused by thimerosal (14.3%), fragrances (12.1%), glutaraldehyde (10.8%), cobalt (9.9%), thiurams (6.7%) or glyoxal (4.9%).

Allergy to rubber was diagnosed in 40 patients (17.9%), including 25 cases of immediate allergy to latex, 8 cases of contact dermatitis from thiuram rubber curing accelerators, and 7 cases of mixed allergy.

It has been concluded that the contact with disinfectants (40.8% of allergic nurses), metals (30.9%) and rubber (17.9%) was the most frequent source of allergy in this group of medical personnel.

INTRODUCTION

There is a general opinion that the number of occupational dermatoses among nurses employed in health care units is in continuous increase (5,7,9,14,16). The commonly used disinfectants display irritating and sensitising activity. Components of protective rubber gloves and other rubber products, metals present in medical instruments, and drugs may be quoted here as other examples of allergens.

The aim of our study was to assess the sources of occupational dermatopathies among the nurses subjected to medical examinations at The Nofer Institute of Occupational Medicine in Łódź during a five-year period (1995–99).

MATERIALS AND METHODS

Patients

The study population comprised 223 nurses from the region of Łódź with suspected occupational skin diseases. The age of the patients ranged from 21 to 69 yr. (mean 39.2 yr.).

Patch tests

All subjects were patch-tested with the European Standard set supplemented with thimerosal, benzalkonium chloride, glutaraldehyde, turpentine peroxides, gold-sodiumthiosulphate, palladium chloride, copper oxide, and copper sulphate (Chemotechnique Diagnostics, Malmö, Sweden). Besides, our own patch-tests with glyoxal, succinaldehyde, chlorhexidine, chloramine, and lysol were routinely applied. Some patients were also tested with other sets, such as fragrance series or rubber additives series. The patch tests were applied and the results interpreted according to the ICDRG recommendations (8).

Prick tests

Prick tests with common aeroallergens (mites, pollens, house dust, moulds, animal hair and feather mix) (Allergopharma, Germany) were performed on all patients, using standard procedures.

Allergy to latex was also examined. The patients with good tolerance to latex gloves were prick-tested with latex (Stallergen, France). The patients reporting pruritus and erythema from contact with rubber gloves had their blood serum specific IgE levels determined (RAST with latex).

RESULTS

Contact allergy i.e. at least 1 positive result of the patch test, was diagnosed in 148 (66.4%) nurses. Table 1 gives the results of the patch test. The most frequent causes of allergy were: quaternary ammonium compounds (benzalkonium) (23.8%), nickel (21.5%), and formaldehyde (20.6%), somewhat less frequent allergy sources included thimerosal (14.3%), fragrances (12.1%), glutaraldehyde (10.8%), cobalt (9.9%), thiurams (6.7%), and glyoxal (4.9%).

The results of the prick test made it possible to diagnose immediate allergy in 80 (35.9%) patients. The sensitivity to *Dermatophagoides farinae* (33 positive prick test) was dominant. This was followed by sensitivity to house dust (31), *Dermatophagoides pteronyssinus* (30), grass pollens (17), tree pollens (17) and weed pollens (17 positive results).

Allergy to latex was diagnosed in 32 (14.3%) nurses (positive prick test with latex in 24, and specific IgE level above 0.35 kU/l in 8 patients).

Table 2 specifies the sources of contact allergy in the nurses under study. Allergy to disinfectants and their components: quaternary ammonium compounds, aldehydes, chloramine, lysol and chlorhexidine occurred most frequently. Of the 91 patients sensitive to these chemicals, 64 (28.7%) reacted positively at least to 1 of the aldehydes. Hypersensitivity to metals was diagnosed in 30.9% of patients



Table 1. Positive results of patch test in 223 nurses

No.	Allergens	n	%
1.	Benzalkonium chloride 0.1%	53	23.8
2.	Nickel sulfate 5.0%	48	21.5
3.	Formaldehyde 1.0%	46	20.6
4.	Thimerosal 0.1%	32	14.3
5.	Fragrance mix 8.0%	27	12.1
6.	Glutaraldehyde 0.2%	24	10.8
7.	Cobalt chloride 1.0%	22	9.9
8.	Potassium dichromate 0.5%	20	9.0
9.	Thiuram mix 1.0%	15	6.7
10.	Cinnamic aldehyde 1.0%	13	5.8
11.	Glyoxal 1.0%	11	4.9
12.	Palladium chloride 2.0%	10	4.5
13.	Chloramine 0.5%	9	4.0
14.	Balsam Peru 25.0%	8	3.6
15.	Neomycin sulfate 20.0%	7	3.1
16.	Colophony 20.0%	7	3.1
17.	Chlorhexidine 0.5%	5	2.2
18.	Succinaldehyde 1.0%	5	2.2
19.	Isoeugenol 1.0%	5	2.2
20.	4-Phenylenediamine 1.0%	5	2.2
21.	Quaternium 15 1.0%	4	1.8
22.	Eugenol 1.0%	4	1.8
23.	Hydroxycitronellal 2.0%	4	1.8
24.	Lysol 1.0%	4	1.8
25.	Goldsodiumthiosulfate 0.5%	4	1.8
26.	Syntarpen (cloxacillin sodium) 0.5%	3	1.3
27.	Dithiocarbamates 1.0%	3	1.3
28.	Cl+Me-isothiazolinone 0.01%	3	1.3
29.	Cinnamic alcohol 1.0%	2	0.9
30.	Fenaktıl (chlorpromazine hydrochloride) ex amp.	2	0.9
31.	Mirenil (fluphenazine hydrochloride) ex amp.	2	0.9
32.	Ylang-Ylang oil 2.0%	2	0.9
33.	Benzocaine 5.0%	2	0.9
34.	Oakmoss absolute 2.0%	2	0.9
35.	Lavender absolute 2.0%	2	0.9
36.	Ethylenediamine dihydrochloride 1.0%	2	0.9
37.	Turpentine peroxides 0.3%	2	0.9
38.	Diphenylguanidine 1.0%	1	0.4
39.	Jasmine synthetic 2.0%	1	0.4
40.	Geraniol 2.0%	1	0.4
41.	Abitol 10.0%	1	0.4
42.	Mercaptobenzothiazole 2.0%	1	0.4
43.	Sesquiterpene lactone mix 0.1%	1	0.4
44.	N-Isopropyl-N-phenyl-4-phenylenediamine 0.1%	1	0.4
45.	Primin 0.01%	1	0.4
46.	Penicillin 10000 IU/g	1	0.4
47.	Streptomycin 1.0%	1	0.4
Total		429	

Table 2. Sources of allergy in 223 nurses

Sources of allergy	n	%
Disinfectants	91	40.8
Metals	69	30.9
Rubber	40	17.9
Drugs	11	4.9

Table 3. Dermatoses in the nurses under study

Skin diseases	n	%
Allergic contact dermatitis	124	55.6
Irritant contact dermatitis	35	15.7
Dermatitis atopica	21	9.5
Contact urticaria	7	3.1
Rosacea	4	1.8
Hyperkeratosis manuum	3	1.3
Dermatitis seborrhoica faciei	2	0.9
Psoriasis vulgaris	1	0.4
No dermal changes	26	11.7
Total	223	100.0

Allergy to nickel and the combined allergy to nickel and cobalt was most common. Hypersensitivity to palladium was always accompanied by allergy to nickel. Rubber induced sensitivity in 40 (17.9%) nurses. Clinical symptoms of immediate allergy to latex (urticaria, papules with erythema) were observed in 25, contact dermatitis to the curing accelerators (tiurams) in 8, and the mixed latex/thiuram allergy in 7 nurses; drug-induced allergy was found only in 11 (4.9%) patients.

Clinical examinations and the results of the additional tests (patch test, prick test, total IgE, blood serum specific antibody levels) provided grounds for the final diagnosis. Allergic contact dermatitis was diagnosed in 55.6% of patients, while irritant contact dermatitis was less frequent (15.7% of patients); dermatitis atopica was detected in 9.5%, and contact urticaria in 3.1% of patients. No skin changes were detected in 11.7% of nurses (Table 3).

DISCUSSION

In the recent years, Polish health service workers have become a professional group with the highest incidence of occupational dermatoses. More and more reports are available in the literature on contact dermatitis induced by exposure to disinfectants. The sensitizing agents include quaternary ammonium compounds (benzalkonium), chloramine, chlorhexidine, and particularly aldehydes (formaldehyde, glutaraldehyde, glyoxal, succinaldehyde). Our results confirm the observations made by other authors on the contribution of disinfectants to skin diseases among the medical personnel (6,7,9). Aldehydes were the major allergens. As much as 20.6% of nurses were hypersensitive to formaldehyde, 10.8% to glutaraldehyde,



4.9% to glyoxal and 2.2% to succinaldehyde. Other authors have also reported an increase in allergy to glutaraldehyde and glyoxal (3,13). Succinaldehyde rarely produces allergy. In Poland, it is present in only one disinfectant (Gigasept FF, Schülke and Mayr, Germany) used to sterilize medical instruments. Although quaternary ammonium compounds display primarily irritating activity, they may also produce allergic contact dermatitis of the hands (4,5). Sometimes, the skin changes were disseminated (2). In our material, 23.8% of nurses reacted to this compound. In some of the cases, allergy might result from non-occupational exposures, as quaternary ammonium compounds are contained not only in the disinfecting agents but also in the eye and nose drops, dental drugs, some cleaning agents and wood impregnating formulations. Like other authors, we also noted single cases of allergy to other disinfectant constituents (chloramine, chlorhexidine, lysol) (1,9,12).

Metals were another source of allergy in the nurses (30.9% of subjects). Every fifth patient reacted to nickel. This metal usually constitutes a non-occupational source of allergy in women wearing jewelry. However, in our opinion, such frequent allergy to nickel in our patients was caused also by contact with nickel instruments at the workplace (medical instruments, injection needles, scissors). Some of our patients reacted to nickel and cobalt, or to nickel and palladium. Nickel and cobalt allergy results from the fact that these two metals usually accompany one another in metal objects, while cross-reaction to nickel and palladium is still disputable. The cross-reaction is suggested by both metals belonging to the same group (VIII) of the periodic table, and given some support by a study of the cross-reactivity of human nickel-reactive T-cell clones with copper and palladium (15,17). Each person studied was hepatitis vaccinated. Popular Engerix B (SmithKline Beecham, Pharmaceuticals) and H-B-VAX II (Merck Sharp and Dohme, Idea Inc.) vaccines contain thimerosal conservant (an organic mercury compound). This explains a high proportion of allergy to this chemical in our material (14.3%).

Recently, there has been a notable increase in allergy to rubber among the medical personnel in many countries. To prevent AIDS and viral hepatitis infections, rubber gloves are used during most operative and diagnostic procedures. In Germany (11), the protective gloves account for 84% of occupational, and 28% of non-occupational cases of allergy to rubber. In the material discussed, allergy to rubber was diagnosed in 40 (17.9%) nurses. Immediate allergy response to latex was found in 25 of them. The role of latex in the development of rubber allergy has been discussed by many authors (10,16,19). Curing accelerators (low molecular weight chemicals added in small quantities to the rubber mix to speed up the curing process) may also be a source of allergy (11). In our patients, thiuram accelerators caused contact dermatitis in the 8 of 40 nurses. In 7 nurses both types of allergy were diagnosed. The reports on mixed allergy have been rare (18). Some authors have failed to report even one case of this type of allergy (10).

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