

Epidemiology of occupational skin disease in Singapore 1989–1998

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This is an epidemiologic study of occupational skin disease in Singapore. All patients diagnosed with occupational dermatoses in the National Skin Centre, Singapore, over the 10-year period 1989–1998 were studied retrospectively. Irritant contact dermatitis was found to be more common than allergic contact dermatitis. The major sources of occupational dermatitis in Singapore were the metal/engineering, building/construction, electrical/electronics and transport industries. The main irritants were detergents/wet work, solvent and oil/grease. The main allergens were chromate, rubber chemicals and nickel. We concluded that the main sources of occupational skin disease and main allergens in Singapore had remained the same compared to a similar study of occupational skin diseases in 1984–85. Weak irritants are still the predominant causes of occupational irritant contact dermatitis, though the main irritants have changed compared to the previous study, where cutting fluids, cement and solvent were the most common irritants.

Key words: occupational dermatoses; allergic contact dermatitis; irritant contact dermatitis; Singapore. © Munksgaard, 2000.

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Occupational skin disease remains the most common occupational disease throughout the world. Contact dermatitis is the predominant type of occupational skin disease. This may be either allergic or irritant contact dermatitis. This is an epidemiologic study of occupational skin disease in Singapore over the 10-year period 1989–1998. The trend and changes in the epidemiology of occupational skin disease in the preceding years were compared.

Patients and Methods

All patients diagnosed with occupational dermatoses attending the Contact and Occupational Dermatoses Clinic at the National Skin Centre between 1989 and 1998 were included in the study. The criteria for the diagnosis of occupational skin disease was based on the definition proposed by the American Medical Association in 1939, i.e., a pathological condition of the skin for which occupational exposure can be shown to be a major causal or contributory factor (1).

The biodata of all patients was recorded. All patients were patch tested to our standard series and additional allergens where relevant. Patch testing was done according to the protocol recommended by the International Contact Dermatitis Research

Group (2). Confirmation of allergic contact dermatitis was based on a relevant positive patch test. Irritant contact dermatitis was diagnosed on circumstantial evidence from the clinical history, examination and chemicals handled, together with a negative patch test. For contact urticaria, the diagnosis was based on a relevant positive prick test result.

Results

965 patients were diagnosed to have occupational skin disease during the study period. The mean age was 33 years (range=14–73 years). More than 1/2 the patients were below the age of 30 years. The male to female ratio was 2.8:1. The race distribution was Chinese 66.7%, Indians 13.3%, Malays 12.8% and others 7.2%. Of the other races, the main ethnic groups were Bangladeshis and Thais.

Contact dermatitis made up 97.2% of all cases of occupational dermatoses. Irritant contact dermatitis (61.2%) was more common than allergic contact dermatitis (36.0%). Patients who had irritant contact dermatitis as well as allergic contact dermatitis were classified under allergic contact dermatitis.

The other non-contact dermatitis occupational

Table 1. Prevalence of irritant contact dermatitis and allergic contact dermatitis by year, 1989–98

Year	Irritant contact dermatitis	Allergic contact dermatitis	Total
1989	58 (65.2%)	31 (34.8%)	89
1990	49 (68.1%)	21 (29.2%)	72
1991	46 (62.2%)	22 (29.7%)	74
1992	72 (64.9%)	33 (29.7%)	111
1993	66 (56.4%)	47 (40.2%)	117
1994	62 (60.2%)	39 (37.9%)	103
1995	66 (54.5%)	54 (44.6%)	121
1996	49 (53.3%)	39 (42.9%)	91
1997	58 (62.4%)	34 (36.6%)	93
1998	67 (71.3%)	29 (30.9%)	94

Table 2. Industrial sources of occupational dermatitis in Singapore, 1989–1998

Industry	Allergic contact dermatitis	Irritant contact dermatitis	Others	Total
metal/engineering	36	121	3	160 (16.6%)
building/construction	110	44	2	156 (16.2%)
electrical/electronics	58	88	7	153 (15.9%)
transport	17	98	7	122 (12.6%)
food/catering	33	59	1	93 (9.6%)
health/pharmaceutical	17	21	1	39 (4.0%)
plastics/fibreglass	7	25	0	32 (3.3%)
chemical/chemical	14	16	1	31 (3.2%)
printing/paper	2	26	0	28 (2.9%)
electroplating	17	6	1	24 (2.5%)
defence	2	19	0	21 (2.2%)
others	33	70	4	106 (11.0%)
total	347	591	27	965 (100%)

dermatoses were mainly heat rash, lesions due to occlusion or friction, insect bites at the workplace, oil folliculitis and pigmentary changes.

There were 23 contact urticaria cases, which were considered under allergic contact dermatitis.

Of these, 20 were due to foods. The rest were due to natural rubber latex gloves, rifle oil and oxalic acid.

Table 1 shows the prevalence of irritant contact dermatitis and allergic contact dermatitis in the individual years from 1989–1998. This is in contrast to the study in 1984–1985, where out of 557 patients (278.5 patients/year), irritant contact dermatitis comprised 55.7% and allergic contact dermatitis 38.6% of occupational dermatoses.

Table 2 shows the industrial sources of occupational dermatitis in this study. With the exception of the building/construction and electroplating industries, irritant contact dermatitis was more common than allergic contact dermatitis in all industries.

The common occupational irritants and allergens are shown in Table 3. The commonest irritants and allergens in the metal/engineering, building/construction and electrical/electronics industries, which were the 3 commonest sources of our occupational dermatoses, are shown in Table 4.

Discussion

Occupational skin disease is still a common cause of absence from work. However, its incidence has decreased significantly from 262.5 cases/year in 1984–85 (3) to 93.8 cases/year in our present study. Contact dermatitis is the commonest type of occupational dermatosis, accounting for 97.2%. This is a slight increase from 94%, when a similar study was done in 1984–85 (3). Irritant contact dermatitis is more common than allergic contact dermatitis, with a ratio of 1.7:1.

The commonest irritants were detergents/wet work, solvent and oil/grease. This is different from our previous study (1984–85), where the most common irritants were cutting fluids, cement and solvent. This may reflect greater awareness and implementation of preventive measures to decrease

Table 3. Common occupational irritants and allergens in Singapore, 1989–1998 versus 1984–85

Irritants	1989–98 (n=591)	1984–85 (n=310)	Allergens	1989–98 (n=347)	1984–85 (n=215)
detergent/wet work	133 (22.5%)	37 (11.9%)	chromate	132 (38.0%)	106 (49.3%)
solvent	133 (22.5%)	53 (17.1%)	rubber chemicals ^{a)}	65 (18.7%)	35 (16.3%)
oil/grease	74 (12.5%)	50 (16.2%)	nickel	46 (13.3%)	27 (12.6%)
coolants/soluble oils	68 (11.5%)	62 (20.0%)	resins ^{b)}	44 (12.7%)	13 (6.0%)
friction	32 (5.4%)	NA	cobalt	41 (11.8%)	28 (13.0%)
acid/alkali	31 (5.2%)	NA	food ^{c)}	33 (9.5%)	5 (2.3%)
fibreglass	27 (4.6%)	NA	colophonium	11 (3.2%)	3 (1.4%)

^{a)} Thiuram, mercapto/mercaptobenzothiazole, carba.

^{b)} Epoxy, acrylate and formaldehyde resins.

^{c)} Prawn, fish, pineapple.

Table 4. Occupational irritants and allergens in the 3 industries most commonly affected by occupational dermatoses in Singapore, 1989–1998 versus 1984–85

Irritants	1989–98 (n=121)	1984–85 (n=81)	Allergens	1989–98 (n=36)	1984–85 (n=27)
Metal/engineering					
coolants/soluble oils	50 (41.3%)	47 (58.1%)	nickel	5 (13.9%)	4 (14.8%)
oil/grease	42 (34.7%)	12 (14.8%)	cobalt	5 (13.9%)	2 (7.4%)
solvent	21 (17.4%)	8 (9.9%)	epoxy	4 (11.1%)	NA
dust	8 (6.6%)	NA	coolant	4 (11.1%)	9 (33.3%)
metals	6 (5.0%)	3 (3.7%)	chromate	3 (8.3%)	4 (14.8%)
friction	5 (4.1%)	NA	barrier cream	3 (8.3%)	NA
Building/construction	(n=44)	(n=49)		(n=110)	(n=106)
cement	23 (52.3%)	40 (81.7%)	chromate(Cr)	70 (63.6%)	63 (59.4%)
oil/grease	6 (13.6%)	5 (10.2%) ^a	chromate/cobalt	20 (18.2%)	15 (14.2%)
solvent	4 (9.1%)	NA	chromate/thiuram	8 (7.3%)	14 (13.2%)
dust	4 (9.1%)	2 (4.1%)	Cr/cobalt/thiuram	6 (5.5%)	0
Electrical/electronics	(n=88)	(n=52)		(n=58)	(n=34)
solvent	31 (35.2%)	14 (26.9%)	resins	19 (32.8%)	11 (32.4%)
flux	16 (18.2%)	23 (44.2%)	rubber chemicals	13 (22.4%)	3 (8.8%)
coolants/soluble oils	10 (11.4%)	7 (13.5%) ^b	nickel	11 (19.0%)	10 (29.4%)
fibreglass	9 (10.2%)	NA	chromate	9 (15.5%)	3 (8.8%)
friction	8 (9.1%)	NA	colophonium	8 (13.8%)	3 (8.8%) ^c

NA: not available. ^a: oils/solvent. ^b: oils/grease. ^c: soldering flux.

skin irritation from cutting fluids and cement in the metalworking and construction industries, respectively.

The main occupational allergens, however, have remained unchanged compared to previous years. The 3 main allergens are still chromate, rubber chemicals and nickel. There is also a significant increase in allergic contact dermatitis from resins, food and colophonium, compared to previous years.

Younger, less-experienced workers are still a risk group due to unfamiliarity and ignorance about industrial hazards. However, the mean age of our patients has increased from 30 years to 33 years. Less than 1/2 (47.5%) of patients were below the age of 30, compared to 55.5% in the previous study. This may be due to better selection of new employees by screening off individuals with sensitive skin from at-risk occupations, and improved pre-employment education regarding preventive measures, by employers in Singapore.

The metal/engineering, building/construction, electrical/electronics and transport industries are still the major sources of occupational dermatitis in Singapore. Weak irritants, i.e., detergents/wet work, solvent and oil/grease, were the commonest cause of irritant contact dermatitis.

Chromate remains the most common occupational allergen in Singapore. However, its predominance as the main occupational allergen has diminished. In our 1984–85 study, it accounted for 49.3% of occupational allergic contact dermatitis or 53 cases per year. In our present study, it has

decreased to 38.0% of all occupational allergic contact dermatitis cases, with an average of only 13.2 cases seen per year. Rubber chemicals and nickel were the next most common occupational allergens. The proportions of these allergens as % of all occupational allergens seen remain roughly the same compared to those reported in earlier years.

In the metal/engineering industry, irritant contact dermatitis was more common than allergic contact dermatitis. Cutting fluid was the most common irritant in the present study, as it was also in our earlier study. In addition, there were 4 workers who were diagnosed to be allergic to cutting fluids. However, the precise allergens could not be ascertained due to inadequate labelling of ingredients in most cutting fluids used industrially in Singapore.

Allergic contact dermatitis was more common than irritant contact dermatitis in the construction industry. 104/110 or 94.5% of patients with allergic contact dermatitis in this industry were allergic to chromates in cement. The other allergens commonly seen were cobalt, which is also found in cement, and rubber chemicals from protective apparel, e.g., gloves and safety boots.

Solvent and flux were the commonest irritants in the electrical/electronics industry. Resins were the most common occupational allergens in this industry, with epoxy and (meth)acrylate resins being the commonest sensitizers.

As yet, there has been no reliable technique to confirm irritant contact dermatitis, although patch

testing has been a well-established test for allergic contact dermatitis for the past few decades.

Conclusions

Contact dermatitis is still the most common occupational dermatosis in Singapore, with irritant contact dermatitis being more common than allergic contact dermatitis. The main irritants are now detergents/wet work, solvent and oil/grease, as compared to our 1984–85 study where cutting fluids, cement and solvent were the most common irritants. The main allergens are still the same, i.e., chromate, rubber chemicals and nickel, but there has been a significant increase in allergic contact dermatitis from resins, food and colophonium. The major sources of occupational dermatitis in Singapore are still the metal/engineering, building/

construction, electrical/electronics and transport industries.

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