

OCCUPATIONAL DERMATOSES IN SOME SELECTED INDUSTRIES IN INDIA

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Twenty five thousand and fifty employees working in 10 industrial units around Delhi were surveyed between July 1982 and September 1983. The industrial units included factories manufacturing tractors, rotating machines, gaskets, leaf springs, footwear, antibiotics and dashboard instruments; units printing cotton and synthetic cloth and books and periodicals; and a copper mine. The chief industrial dermatoses encountered were callosities 108 cases, contact dermatitis 36 cases, traumatic nail dystrophy 14 cases, frictional dermatitis of finger-tips 10 cases, oil acne 10 cases, stasis dermatitis 3 cases, traumatic leucoderma 2 cases and keloid 2 cases. A total of 146 cases had industrial dermatoses, while 1085 cases had non-occupational skin disorders. The over-all incidence of occupational dermatoses in these industries was considerably low.

Key words : Industrial, Dermatoses

Progressive industrialization leads to exposure of workers to an increasing number of occupational hazards. Skin is considered to be the most commonly affected organ,¹ though other organs such as the eyes, lungs, liver and urinary bladder are also frequently involved.²

Unfortunately, information about industrial dermatoses in India is quite meagre. Singh³ described reports of dermatitis in the dye industry and provided evidence that the dermatitis caused by benzanthrone is a photocontact dermatitis. Bhate⁴ recorded dermatitis in 29 of the 39 workers employed in a heavy electrical industry. This dermatitis was attributed to a volatile epoxy varnish, although the workers were exposed to an insulating tape as well and patch tests had not been undertaken to confirm the cause. One of us (JSP)⁵ had investigated a similar unit employing 250 workers and discovered 25 workers having dermatitis. The dermatitis in 10 cases was due to the insulating tape (Samica therm) confirmed by patch tests and not due to the varnish. The remaining workers complained of itching of the exposed

parts caused by the glass fibres present in the glass-tape used for insulation. Singh and Bhar⁶ documented contact dermatitis in 25 of the 103 workers coming in contact with an antirust compound containing sodium dichromate. But patch tests with sodium dichromate were positive in 3 cases only. Mathur⁷ described 49 cases of contact dermatitis among 250 workers in a cottage dyeing industry. The dermatitis affected chiefly the hands and forearms. Fourteen workers developed a positive patch test reaction with various dyes.

In order to evaluate the prevalence of industrial dermatoses, we have surveyed 10 industrial units located around Delhi. These included units manufacturing tractors, rotating machines, gaskets, leaf springs, footwear, antibiotics and dashboard instruments; units printing cotton and synthetic cloth and books and periodicals; and a copper mine. The selection of the industrial units was random.

Material and Methods

In each case, the workers were informed well in advance about the dates of visit of the team of dermatologists. Every worker having any type of skin disease was instructed to report. Workers reporting for any dermatological

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problem were thoroughly examined for any dermatosis which could be attributed to the occupational work. For this, a special record was made of the duration of employment, nature and duration of the present duties, the agents to which the worker was exposed, duration of the present illness, site of onset of the condition, its mode of spread, the effect of holidays and whether other workers were affected. In patients suspected to have contact dermatitis, the cause was confirmed by patch tests with the standard antigens, as well as with the materials actually being used by the patients. Side by side, a tour of the premises of the industrial unit was undertaken to obtain first-hand information about the mode of exposure of various workers to different industrial agents.

The cases thus encountered, were classified into the occupational and non-occupational dermatoses.

Results

Out of 25,050 employees in the ten industrial units surveyed, 1159 (4.6%) had dermatologic problems, 1085 (4.3%) workers had dermatoses unrelated to their occupation, while 146 (0.6%) had occupational dermatoses. Some workers had more than one type of skin disease. The various occupational dermatoses encountered in this survey are shown in table I.

Table I. Industrial dermatoses encountered in the survey.

Industrial dermatosis	Number of cases
1. Callosities	108 (0.43%)
2. Contact dermatitis	36 (0.14%)
3. Traumatic nail dystrophy	14 (0.06%)
4. Frictional dermatitis of finger-tips	10 (0.04%)
5. Oil acne	10 (0.04%)
6. Stasis dermatitis	3
7. Traumatic leucoderma	2
8. Keloid	2
9. Leucoderma	1
10. Acid burns	1
11. Infected wound	1
12. Subungual haematoma	1
13. Post-inflammatory hyperpigmentation	1

Callosities

Occupational callosities were recorded in 108 workers. Some callosities were mild, while a few workers had very thick callosities; some of them were located at characteristic sites. A moulder in the printing press had callosities on the apposing surfaces of his right thumb and index finger caused by gripping the blade of the printing machine. Another characteristic callosity was seen in a helper in the dashboard instruments unit who had a thick callosity on the centre of his right palm produced by pressure against a heavy screw-driver.

Contact dermatitis

Thirty six workers had occupational contact dermatitis. The severity varied from a mild pruritus with occasional erythematous papules to a severe exudative dermatitis necessitating absence from work. In the majority, the hands and forearms were affected but in 6 patients the dermatitis involved the feet and the legs. The antigens producing positive patch test reactions were diesel oil (4 cases); scarlet dye, boiler dust from the copper mining unit, footwear antigens such as the PVC and rubber (3 cases each); and ferric chloride, nickel sulphate, potassium dichromate, cobalt chloride, electro-precipitator dust and concentrator dust from the copper concentrating units (2 cases each). The other antigens producing a positive patch test result are shown in table II. The time interval between start of the employment and onset of dermatitis varied from a few days to 29 years. Summer exacerbation was seen in 39% cases, while 58% cases had noticed relief during vacations. Positive patch test reactions to more than one agent were seen in 42% of the patients.

Traumatic nail dystrophy

This was seen in 14 cases. Ten of these cases belonged to 2 industries, namely, the rotating machines plant and the tractor assembly unit; both of these engineering units have an

Table II. Causes of contact dermatitis in various industrial units.

Industrial unit	Agents producing a positive patch test in the patients (The figure in parenthesis indicates the number of cases)			
1. Tractor assembly plant	Diesel oil (1)	Ferric chloride (1)	Barrier cream (1)	Jute (1)
2. Printing press	Nickel sulphate (1)	Potassium dichromate (1)	Printing ink (1)	
3. Rotating machines unit	Lead acetate (1)	Potassium dichromate (1)	Ferric chloride (1)	
4. Gaskets unit	Cobalt chloride (1)	Nickel sulphate (1)	Copper scrapings (1)	Aluminium scrapings (1)
	PCRCA Scraping (1)	CEMJO scraping (1)	Tin disc (1)	
5. Cloth mill	Scarlet dye (3)	Yellow GN dye (1)	Sodium hydrogen sulphate (1)	
6. Pharmaceutical unit	Hard gum (1)	Soft gum (1)	Enamel white paint (1)	
	Monobenzyl ether of hydroquinone (1)		Mercaptobenzothiazole (1)	
7. Copper mine	Diesel oil (3)	Boiler dust (2)	Electroprecipitator dust (2)	
	Concentrator dust (2)	Rubber of shoe (2)	Synthetic material of shoe (1)	
	Cobalt chloride (1)	Turpentine (1)		

increased risk of trauma. The nail changes included longitudinal ridging, thickening, cracking, irregularity, pigmentation, thickening of the nail-bed and loss of the nail plate. A distinctive occupational nail mark was observed in the rotating machines factory, where a winder of the copper wire was found to have grooves on the free edges of the nails of his right little and ring fingers (Fig. 1) corresponding to the friction produced by the copper wire.

Frictional dermatitis of the finger-tips

This was seen in 10 cases, nine of which were encountered in the gasket manufacturing unit. The tips of the thumbs and the index fingers showed small criss-cross cuts produced by constant friction against the rough gasket materials. The tenth case, seen in the footwear

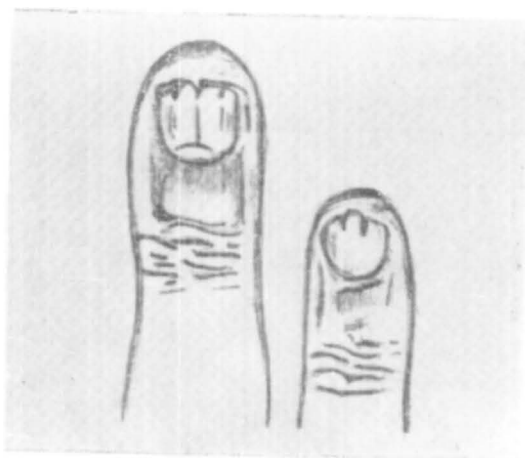


Fig. 1. Notching of the nails seen in a copper wire winder.

unit was a male lacer who had a shiny hyperkeratosis of the palmar aspects of his thumbs with small cuts.

Oil acne

Ten cases of oil acne were recorded among the workers exposed to either the machine oil or the cutting oil. While 2 workers had only a few sparse comedones on the dorsal aspects of their fingers, others had extensive comedones along with inflammatory papules and papulopustules affecting the limbs. In one case even the buttocks were involved. The interval between the start of work and the appearance of lesions varied between a few days and six years. Six workers experienced summer exacerbations and two had partial relief during abstinence from work for 3 months and 5 years respectively. All these workers were in the habit of wearing oil-smearred clothes.

Leucoderma

A supervisor in the pharmaceutical plant had depigmented macules on both his hands. These patches had appeared 2 years ago, soon after he began using rubber gloves. In addition, he had contact dermatitis on his hands and on patch testing, reacted positively to two rubber antigens, namely mercaptobenzothiazole and monobenzyl ether of hydroquinone. There was no depigmentation in 48 hours; longer observation was not possible.

The other occupational dermatoses seen were stasis dermatitis (3 cases), traumatic leucoderma (2 cases), keloid (2 cases), acid burns, infected wound, subungual haematoma and post-inflammatory hyperpigmentation in 1 case each.

Comments

An industrial worker, like any other individual is equally likely to develop any skin disease unrelated to his occupation. It is therefore most important to establish that the dermatosis has indeed developed because of the occupational exposure. The criteria which suggest that the

dermatosis is occupational in origin should include the following : (1) The dermatosis must have made its appearance only after the individual started his work. (2) It should subside or regress within a reasonable period of abstinence from work and should reappear on resumption of the same work. (3) Its morphology should conform to that known to be produced by the suspected agent. (4) The causal association should be confirmed by an appropriate test as far as possible.

Callosities and frictional dermatitis of the finger-tips are in fact occupational marks and develop as a protective mechanism against constant friction. Callosities are most common in the industries which require heavy manual work, while frictional dermatitis develops whenever the skin is exposed to a constantly moving object. Sometimes, callosities were noticed in individuals whose occupation did not involve heavy manual work. Such workers were always found to undertake heavy manual work as a part of the extra-occupational activity, or as a hobby.

The incidence of contact dermatitis throughout the survey was found to be low. Each industrial unit had only a few cases caused by different contact antigens. In fact none of these industrial units revealed any contactant specifically common in the unit.

Nail deformities in the industrial workers were common because of frequent episodes of trauma. The deformity seen in the copper wire winder in our survey was different from the one described in the Japanese silk weavers,⁸ because the saw-like edge of the nails in the silk weavers had been produced artificially to help in the professional work. Ronchese⁹ had also described onycholysis and loss of the nails occurring due to trauma in a worker handling chicken feedbags. The worker was already having congenital lamellar onychoschizia leading to splitting of the free edge of the nail into thin layers.

Oil acne is seen chiefly in workers who are constantly exposed to cutting oils or machine oils. Insoluble cutting oils are more likely to cause oil acne.¹⁰ Since all workers are not affected, a certain degree of predisposition to develop oil acne is essential. Oil acne is frequent in workers who keep wearing oil-soaked clothes for prolonged periods. The chemicals responsible for causing occupational acne include chlorinated aromatic hydrocarbons used as pesticide, DDT, crude petroleum and heavy coal-tar distillates and asbestos.¹¹ Morris and Maloof¹² attributed dermatitis and acne caused by cutting oils to the persistence of the oils on the skin of the workers in spite of adequate cleaning. The cutting oils are believed to cause a mechanical obstruction of the pilo-sebaceous duct leading to comedo formation.¹³ Bacterial contamination of the cutting oils as a cause of lesions was ruled out because cultures from the oils were consistently negative;¹⁰ however, the skin surface flora were still considered to play a role.

Vitiligo can be considered to have an occupational origin, if it involves skin areas exposed to the depigmenting agent(s) employed in the occupation. Various depigmenting agents known to cause occupational leucoderma include monobenzyl ether of hydroquinone,¹⁴ para-tertiary butyl phenol (PTBP) and para-tertiary butyl catechol (PTBC).¹⁵ It is however often difficult to prove that the individual was not predisposed to develop vitiligo, and that it is not entirely a coincidental development. In case, vitiligo is limited to the areas exposed to the causative agent, it may be considered likely to be occupational in origin, but even if it spreads to other body areas as observed in the case reported by Bajaj and Gupta,¹⁶ the possibility of the depigmenting agent having been absorbed through the skin or through other routes and acting at remote areas cannot be excluded. Sometimes, vitiligo may follow occupational contact dermatitis or an injury in an industrial worker. Such cases are preferably called secondary leucoderma.

The over-all incidence of industrial dermatoses in our study was fairly low. It has, however, to be borne in mind, that since it was not possible to examine every worker, it is quite possible that some workers who had some industrial dermatosis were not included. Thus, the actual prevalence rates of the industrial dermatoses may be slightly higher than those recorded by us.

Acknowledgement

This survey was carried out under the Department of Science and Technology project, "National Survey for the Causes of Contact Dermatitis".

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