

## CONTACT DERMATITIS OF HANDS IN CHANDIGARH

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Sixty four patients (40 males, 24 females) of contact dermatitis of hands were patch tested. The patients included housewives (22), factory workers (16), office workers (8), medical and paramedical personnel (8), building workers (3), teachers (4), and photographer, farmer and student one each. The substances tested included battery of metals, rubber chemicals, common medicaments and suspected substances. Sensitivity to metals was found in 34 (53.1%) patients and nickel, cobalt and chromate in 40.6, 31.2 and 21.8% patients respectively. Medicament, rubber and vegetable sensitivity was found in 26 (40.6%), 13 (20.3%) and 13 (20.3%) patients respectively. The miscellaneous sensitizers were positive in 15 (23.4%) patients. They included plants, oils, file cover, currency notes, DDT (dichlorodiphenyltrichloroethane), PPD (paraphenylenediamine), formaldehyde, mercuric chloride, film and paper developer.

**Key words :** Contact dermatitis; Hands.

Contact dermatitis of hands is a common disorder. The incidence of hand dermatitis varied from 10.9 to 58% in different reports.<sup>1-3</sup> It results in significant morbidity and loss of working hours. A study was conducted to elucidate the patch test positivity in the patients having contact dermatitis of hands.

### Materials and Methods

Eighty consecutive patients having dermatitis confined to hands were studied. The patients suspected to be suffering from cumulative insult dermatitis were excluded from the study. A detailed history regarding duration, site of onset, progression, relation to occupation, season, aggravating factors, exact nature of work, hobbies, spare time activities and atopy was recorded. All the patients were tested with the following substances: (a) Metals: Nickel sulphate 5.0%, cobalt chloride 1%, copper sulphate 0.1%, ferric chloride 2% and potassium dichromate 0.5%, (b) Rubber chemicals: Thiuram mix 1%, carba mix 3%,

PPD mix 0.6% and mercapto mix 1%, (c) Medicaments: Neomycin sulphate 20%, nitrofurazone 1%, oxytetracycline 3% and sulfadiazine 5%, and (d) Petrolatum base. All the antigens were prepared in petrolatum except ferric chloride and potassium dichromate which were in aqueous base. All the patients were also tested with various substances with which contact allergy was suspected. Housewives and domestic servants were in addition tested with fresh juices of vegetables and fruits. Office workers and teachers were tested with paper, carbon, zerox and cyclostyled papers, newspaper, inks and formaldehyde; factory workers with lubricating, cutting and mobil oils, grease and barrier creams and building masons with building materials. Medical and paramedical personnel were tested with all antibacterial and antifungal ointments and other substances whenever indicated. Patch testing was carried out by standard method<sup>4</sup> with the indigenous patch test unit resembling Finn chamber.<sup>5</sup> It consisted of 12.0 × 5 cm strip of Johnson sticking plaster with two parallel rows of five aluminium discs of 7 mm diameter placed at a distance of 2 cm from the center of each other. These discs were obtained from discarded injection vial tops. The concentrations of antigens for patch testing were as recommen-

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ded by the International Contact Dermatitis Reserch Group (ICDRG)<sup>4</sup> and Fisher.<sup>6</sup> Patch test readings were carried out 48 and 72 hours after application of patch tests.

## Results

Eighty patients (47 males and 33 females) had dermatitis of hands out of 400 patients registered in the clinic. Two patients were sensitive to petrolatum base and were excluded from analysis. Patch test results were available for 64 patients (40 males and 24 females) with a mean age of 35.0 years. They had dermatitis for an average period of 1.7 years. This group comprised of 22 housewives, 16 factory workers, 8 office workers, 8 medical and paramedical personnel, 3 building masons, 4 teachers and 1 student, farmer and photographer each. Metal, medicament, rubber and vegetable sensitivity was found in 34

(53.1%), 26(40.6%), 13(20.3%) and 13(20.3%) respectively. Nickel sensitivity was found in 45.8% females and 37.5% males, cobalt sensitivity in 16.6% females and 40% males. Sensitivity to copper sulphate was found in 12.5% females and 32.5% males, to potassium dichromate in 20.8% females and 22.2% males, and to ferric chloride in 4.2% females and 7.5% males. The miscellaneous sensitizers were positive in 15(23.4%) patients. The sensitivity to various antigens in different occupations is shown in table I and vegetable and fruit sensitivity in 22 housewives in table II. The commonest sensitizing medicament was nitrofurazone (28.1%), followed by neomycin (17.2%), sulfadiazine (12.5%), oxytetracycline, clotrimazole, miconazole, tolnaftate in 7.8% each. Buclosamide and promethazine sensitivity was found in three patients each, savlon, sodium fusidate in 2 each and dettol, acriflavin, piodin and multifungin in one patient each.

Table I. Sensitivity to various substances in different occupations.

Occupation	Number tested	Number of patients positive with					Miscellaneous
		Vegetables	Metals	Rubber	Medicaments		
1. Housewives	22	12	11	3	8	<i>Jasminus arborescens</i> (Chameli) <i>Carica papaya</i> (Papaya)	1
2. Office workers	8	1	4	2	4	Currency notes Rs. 10, 20, Black paint scraping Pink file cover	1 1 1
3. Factory workers	16	NT	12	3	5	Mercuric chloride Zinc oxide Mobil, cutting oils Brake oil, grease	2 1 1 1
4. Teachers and student	6	0	1	2	1	<i>Ocimum sanctum</i> , <i>Pothos</i> species	1
5. Medical and paramedical workers	8	NT	4	1	8	DDT PPD Formaldehyde Formaldehyde	1 2 1 1
6. Building masons	3	NT	2	1	0		
7. Miscellaneous (Photographer, Farmer)	2	NT	0	1	0	Paper developer and film developer	1

Table II. Vegetables and fruit sensitivity in 22 housewives.

Botanical name	Common name	Number positive
1. <i>Allium sativum</i>	Garlic	5
2. <i>Allium cepa</i>	Onion	4
3. <i>Brassica oleracea</i> var. botrytis	Cauliflower	3
4. <i>Cucurbita pepo</i>	Pumpkin	2
5. <i>Cucurbita maxima</i>	Gourd	2
6. <i>Phaseolus vulgaris</i>	French bean	2
7. <i>Hibiscus esculentus</i>	Lady finger	2
8. <i>Capsicum frutescens</i> var. longum	Green chilly	2
9. <i>Daucus carota</i>	Carrot	2
10. <i>Acharas zapota</i>	Cheeku	2
11. <i>Spinacia oleracea</i>	Spinach	1
12. <i>Brassica oleracea</i> var. capitata	Cabbage	1
13. <i>Raphanus sativus</i>	Radish	1
14. <i>Cucumis sativus</i>	Cucumber	1
15. <i>Cucumis melo</i> var. utilissimus	Kakri	1
16. <i>Momordica dioica</i>	Bitter gourd	1
17. <i>Citrullus vulgaris</i> var. fistulosus	Tinda	1
18. <i>Pisum sativum</i>	Peas	1
19. <i>Solanum tuberosum</i>	Potato	1
20. <i>Solanum melongena</i>	Brinjal	1
21. <i>Lycopersicon esculentum</i>	Tomato	1
22. <i>Zinziber officinale</i>	Ginger	1
23. <i>Malus sylvestris</i>	Apple	1
24. <i>Prunus armeniaca</i>	Khoobani	1
25. <i>Citrus aurantium</i>	Orange	1

### Comments

Contact dermatitis of hands is a common and multifactorial disease. It may be preceded or perpetuated by irritant effect of soaps and detergents and repeated washings. Allergic contact dermatitis of hands can be caused by a variety of substances depending upon person's occupation(s), hobbies, surroundings and treatment taken. However, metals are one of the most common causes of contact dermatitis, nickel being a frequent offender in females and chromates in males.<sup>7</sup> Exposure to nickel can occur with handles of doors, bags and umbrellas, cutlery, ornaments especially earrings, paper pins and clips, needles, thimble,

scissors, coins, pens, hair pins, brassiere hooks, spectacle frames, zippers, watches, watch chains and bracelets.<sup>6</sup> Nickel can be leached out of stainless steel utensils by action of sweat, soaps and detergents.<sup>8</sup> The industrial exposure to nickel occurs in electro-plating, as mordant in dyeing and printing fabrics, electrical wiring, ceramics, duplicating fluids and fluxes, pigment for paint and wall paper, paint for glass, enamels, alkaline batteries, hydrogenation of fats, nickel alloys, insecticides, magnet cores, fuel additives, permanent wave solutions and dyes.<sup>9</sup> Agrup<sup>1</sup> found 12% (56 of 462) women and none of 250 men with hand eczema sensitive to nickel in Sweden. Nickel sensitivity in England and Europe was found in 21% and 11% women respectively with hand eczema.<sup>7</sup> In the present study 45.8% of women and 37.5% men were sensitive to nickel. The frequent sensitization in men was due to the fact that most of factory workers were employed in the metal factories. No comparable data is available from India, however nickel sensitivity was found in 19.8% of patients tested.<sup>10</sup> Sharma and Sharma<sup>11</sup> found 36.3% of housewives sensitive to nickel in cases suspected of metal sensitivity. It is essential to test all cases of contact dermatitis of hands with nickel sulphate as sensitivity cannot be clinically suspected.<sup>12</sup>

Chromium is used in steel alloys, electroplating, tanning, dyeing, pigments, photographic and printing industries, as an anticorrosive, in making chromates.<sup>7</sup> Chromates are also found in bleaching agents, matches, hide glues, detergents, brushless shaving creams, paints and polishes, ashes, foundry sand, fabrics and cements.<sup>6</sup> No significant difference in chromate sensitivity was found in males and females. However cobalt sensitivity was found in 40% males and 16.6% females. Allergy to cobalt often accompanies chromate sensitivity in men and nickel sensitivity in women.<sup>7</sup>

Vegetables are not an uncommon cause of contact dermatitis of hands in housewives and

cooks. It occurs as scaling and fissuring of palmer surface of index, middle fingers and thumb.<sup>13</sup> The most common sensitizers are *Allium sativum*, *Allium cepa*, *Lycopersicon esculentum*, *Daucus carota*, *Hibiscus esculentus* and *Zinziber officinale*.<sup>13</sup> The sensitizing substances in garlic have been recently identified by human and guinea pig studies as diallyl disulphide, allylpropyl disulphide and alliin.<sup>14</sup> Vegetable sensitivity was found in 54.5% housewives tested in this study. Bajaj,<sup>15</sup> Pasricha and Kanwar<sup>16</sup> reported vegetable sensitivity in 75.8 and 62.7% of housewives eczema respectively. *Allium sativum* and *Allium cepa* being the most frequent sensitizers (Table II). Multiple vegetable sensitivity was found in four patients.

The natural rubber is not a sensitizer but additives like accelerators, antioxidants added during processing are common sensitizers. Thiurams, mercaptobenzothiazoles (MBT), guanidines, dithiocarbamates and amine accelerators, and paraphenylenediamine, dihydroxyphenol, monobenzyl ether of hydroquinone, quinoline and peptizer antioxidants are common sensitizers.<sup>7</sup> Exposure to rubber at home occurs with rubber gloves, underclothes, shoes, finger stalls, socks, stockings, rollers, apron, pillows, contraceptives, tourniquet, bathing caps, scuba diver face mask, hearing aid, hot water bottle, flexes and electrical plugs, water hose, pipes, balloons, toys and squash balls. These patients react with thiurams and MBT.<sup>7</sup> Men are sensitized by exposure to rubber in tyre and transport industries, dairy farming, face masks, conveyor belts, agriculture equipment and occasionally by domestic exposure. Hence rubber chemicals form part of standard trays for patch testing recommended by International Contact Dermatitis Research Group,<sup>4</sup> North American Contact Dermatitis Group<sup>6</sup> and St. John's Institute of Dermatology, London.<sup>7</sup> Rubber sensitivity was found in 12.5% females and 22.5% males with hand eczema. No comparative data is available from India. Tiwari et

al<sup>17</sup> reported contact dermatitis to rubber footwear in 7.2% of 470 soldiers tested. However, rubber sensitivity was found in 6.8-10% patients and occurs with equal frequency in both sexes.<sup>7</sup>

Sensitivity to antibacterial agents has been reported by several workers.<sup>18-19</sup> Bajaj and Gupta<sup>19</sup> reported sensitivity to nitrofurazone (36.2%), neomycin sulphate (35.9%), oxytetracycline (22.1%), cetrimide (18.6%) and framycetin (16.7%) in patients suspected to be having allergic contact dermatitis to local antibacterials. However, in patients with contact dermatitis of hands, oxytetracycline, neomycin and sulfadiazine were most frequent sensitizers.<sup>15</sup> Sensitivity to medicaments was found in medical personnel (100%), office workers (50%), factory workers (32%) and housewives and domestic workers (27.5%) in the present study. Nitrofurazone, neomycin and sulfadiazine were most frequent sensitizers in both medical and non-medical personnel.

The miscellaneous substances reported to cause contact dermatitis are mustard khal and mustard oil,<sup>20</sup> tobacco in bidi,<sup>21</sup> dyes used in clothes, and insulating tapes (Samica therm),<sup>22</sup> diesel oil, printing ink, jute, barrier cream, enamel white paint, turpentine, soft and hard gum, boiler and concentrator dust.<sup>23</sup> Contact dermatitis was found in 36 out of 25050 workers examined in industries around Delhi.<sup>23</sup> No case of contact dermatitis was found in 106 workers and silk industry studied in Bangalore.<sup>24</sup> The miscellaneous sensitivities seen in this study were as depicted in table I. One housewife was sensitive to the leaves of *Jasminum arborescens* (chameli) and *Carica papaya* (papaya). One bank cashier to currency notes (Rs. 10 and 20) and black paint scraping of the chair, accountant to the pink file cover and formaldehyde, clerk to the leaves of *Pothos* species (money plant) and *Ocimum sanctum* (tulsi), and another to *Allium sativum* (garlic), *Capsicum frutescens* (green chillies). Two dry cell battery factory workers

were sensitive to mercuric chloride and one to zinc oxide, a turner to mobil and cutting oils, and a motor mechanic to grease and brake oil. A photographer was sensitive to paper and film developer. The dermatitis in all these patients improved when offending agents were withdrawn.

In the present study metals, medicaments and rubber sensitivity was seen in 53.12, 40.62 and 20.03% respectively in contact dermatitis of hands. After testing with these and other suspected substances positive patch tests were found in all except six patients. Hence we suggest that metals and medicaments should be tested in all patients with contact dermatitis of hands in addition to the suspected substances and the rubber chemicals should be tested only in suspected cases.

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