

A Study of Clinical Patterns and the Role of Patch Testing in Determining the Etiological Factors in Hand Dermatitis

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Abstract

Background: Hand dermatitis is a distressing and disabling condition of multi-factorial origin. An estimated 2% to 10% of the general population is affected by hand dermatitis. It appears to be the most common occupational skin disease, comprising 9% to 35% of all occupational diseases and up to 80% or more of all occupational contact dermatitis. In these contact dermatitis of hands, more than half of patients (58.5%) had Irritant contact dermatitis (ICD) and 41.5% had Allergic contact dermatitis (ACD). Patchtesting, at present, is the only scientific method to detect the cause of contact dermatitis.

Aims: To assess clinical types of hand dermatitis and to evaluate the role of patch testing in patients with hand dermatitis using Indian Standard Battery, Cosmetic and Fragrance Series, Vegetable Series.

Materials and Methods: A total of 100 patients with ACD of hands attending dermatology OPD Kempegowda Institute of Medical Sciences (KIMS), Bengaluru, after clinical diagnosis who consented for the study were included and studied over a period of 18 months. Patch testing was done by using Indian Standard Battery Series, Cosmetic and Fragrance Series, and Vegetable Series. The patches were removed after approximately 48 hours and the sites of contact of allergens were marked with a marking pen. Reading was taken after 30 minutes.

Results: A total of 100 patients of ACD of hands were studied. The incidence was 6.3%, of which 45% were males and 55% females. Soaps and detergents were the most common aggravating factor (27%), followed by vegetables (9%). Hyperkeratotic eczema was the most common morphological form (46%). Patch test was positive in 58% and negative in 42% of the study group. The common sensitizers were phenylenediamine(22%), fragrance mix(18%), parthenium hysterophorus (15%), Balsam of Peru (12%), potassium dichromate (6%), Thuiram mix(6%), Nickel sulphate (6%), Colophony and Epoxy resin (4%), wool alcohol(1%). Among the cosmetics and fragrances series common sensitizers were Thiomersal (36%), Cetrimide (13%) while in the vegetables series Garlic, Chilly, Onion, Ginger were 20% each and Brinjal, Potato were 10% each in the study group.

Conclusion: In this study patch test was found to be a useful investigative procedure for Allergic contact dermatitis of hands. The Indian standard battery series is useful but insufficient.

Keywords: Allergic Contact Dermatitis, Patch Test, Hand Dermatitis.

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Introduction

Hand dermatitis is a very common and wide spread condition frequently seen in dermatological practice causing physical and emotional distress. Various morphological forms of hand eczema are seen, which differ only clinically rather than histologically. Based on the morphology Burton has classified hand dermatitis as pompholyx, recurrent focal palmar peeling, hyperkeratotic palmar eczema, ring eczema, wear and tear dermatitis (Housewives dermatitis), fingertip eczema, apron eczema, discoid eczema, chronic acral dermatitis, gut eczema, patchy vesiculosquamous eczema. [1] Hand eczema has a high public health and socio-economic significance, affecting 9.7% of general population [2] and accounting for up to 40% of all occupational diseases. [3] It has resulted in medical consultation in 70%, sick leave (more than 7 days) in about 20% and job change in about 10 %. [4] The impact is quite enormous on affected individual in terms of psychosocial embarrassment and health related quality of life. The patch test was first used by Jozef Jadassohn in 1896, he established the success of reproducing contact dermatitis. The test is based on the principle that whole skin of an allergic individual is capable of reacting with the causative antigen. This study was conducted to assess the usefulness of patch test in identifying hand eczema with newer causative agents.

Materials and Methods

The study was conducted over a period of 18 months from December 2012 to June 2014, in the Department of Dermatology, KIMS, Bengaluru where a total of 100 patients with allergic contact dermatitis of hands were included in this study.

Inclusion Criteria:

- All cases of allergic contact dermatitis of hands.
- Age group between 18-65 years □

- Both sexes.
- Patients who gave consent for patch testing.

Exclusion Criteria:

- Age groups less than 18 years and more than 65 years.
- Pregnant and lactating women.
- Patients presenting with active flaring dermatitis.
- Patients on systemic corticosteroids, immunosuppressants
- Immunodeficient, cancer and Hansen's patients.

The patients with hand dermatitis were patch tested after obtaining informed consent and detailed history and examination with the Indian Standard Battery approved by the Contact and Occupational Dermatoses Forum of India (CODFI), manufactured and supplied by Systopic Laboratories, New Delhi and Cosmetic and Fragrance Series and vegetable series.

The antigens were placed in Aluminium Finn chambers (Figure1) in the prescribed sequence. The back was thoroughly cleaned with spirit and excessive hair was shaved before application the patch test units. The patients were instructed not to have a bath or to wet the lesion and to refrain from strenuous physical activity. They were also instructed not to wear tight under clothes, to avoid friction, rubbing or scratching and to avoid exposure to sunlight or UV light. The patches were removed after approximately 48 hours and the sites of contact of allergens were marked with a marking pen. Reading was taken after 30 minutes with instruction to avoid leaning against the chair while sitting, to allow the pressure effects of the patches to wear.

A second reading was taken on day 4 (96 hrs) after application of patch to confirm the presence of allergic reaction that will persist or increase and irritant reaction will

subside.

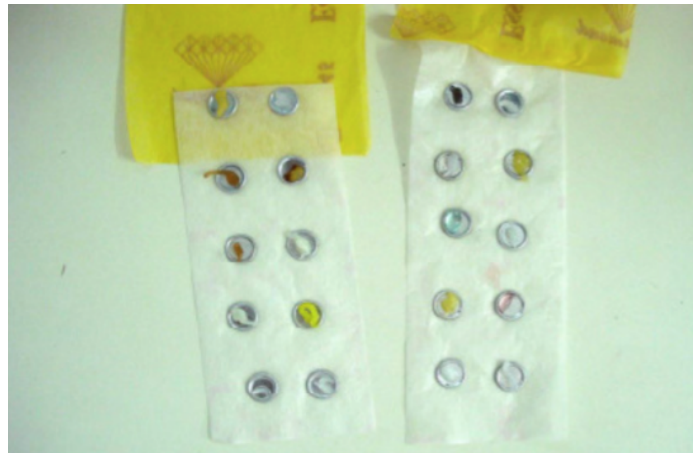


Figure 1: Patch test unit- aluminum finn chambers with allergens

The observations were graded according to the ICDRG recommendation (International Contact Dermatitis Research Group) (Table 1)

Table 1: Grading of Patch test reading

	Negative reaction
?+	Doubtful reaction; Faint erythema only
+	Weak positive reaction; Palpable erythema, infiltration, possibly papules
++	Strong positive reaction; Erythema, infiltration, papules and vesicles
+++	Extreme positive reaction; Intense erythema and infiltration and coalescing vesicles.
IR	Irritant Reaction of different types
NT	Not Tested

Statistical Analysis

The collected data was entered in Microsoft Excel and analyzed with descriptive statistics expressed in the form of tables and graphs

Results

A total of 100 patients with hand dermatitis participated in the study. 34% of the patients belonged to age group between 31 to 40 years. 20% in the group of 41-50 years, 19% in group of less than 30 years, 17% in group of 51-60 years and 10% above 60 years.

Out of 100 patients, 45 (45%) were males and 55 (55%) females. The male to female ratio is 0.8:1.

Among females 63% were housewives, while in males the unskilled workers were

about 49%, who were the most number of cases recorded in this study.

Out of 100 patients, 27% patients gave a positive history to precipitation by contact with soaps and detergents out of which 74% were females and 26% were males, 6% patients for plants out of which 34% were females and 66% were males, 9% to vegetables out of which 56% were females and 44% were males and 5% had a history of precipitation on contact with chemicals.

46% of patients presented with hyperkeratotic palmar eczema, which was the most common morphological form in this study. Other morphological patterns were pompholyx (17%), recurrent focal palmar peeling (16%), fingertip eczema (14%), wear and tear dermatitis (4%), ring eczema (2%) and patchy vesiculosquamous eczema (1%). (Table 2)

Table 2: Incidence of Morphology of Lesions

Morphology of Lesions	Male	Female	Total
Pompholyx	9	8	17
Recurrent focal palmar peeling	4	12	16
Hyperkeratotic palmar eczema	23	23	46
Ring Eczema	1	1	2
Fingertip eczema	8	6	14
Wear and tear dermatitis	0	4	4
Discoid eczema	0	0	0
Patchy vesiculosquamous eczema	0	1	1
Total	45	55	100

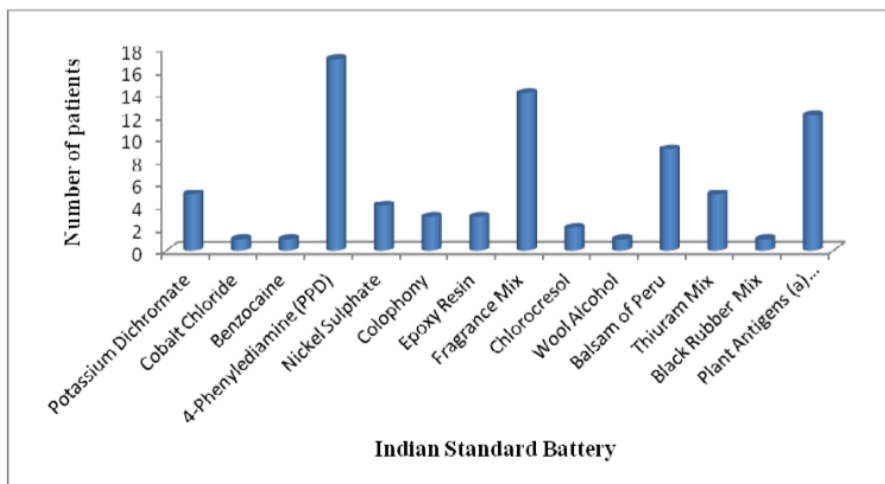
Out of 100 patients patch tested, 58 patients (58%) gave positive patch test results out of which 21 patients (21%) were sensitive to single antigen and 37 patients (37%) were sensitive to multiple antigens and 42 patients (42%) were negative for patch test. (Table 3)

Table 3: Incidence of Patch Test Result

Patch Test Result	Total	Percentage
Single antigen Positive	21	21%
Multiple antigen Positive	37	37%
Negative	42	42%
Total	100	100%

In the Indian Standard Battery, Phenylendiamine was the most common sensitizer with 17 patients (22%) testing positive for it. Fragrance mix sensitivity was seen in 14 patients(18%), Parthenium Hysterophorus sensitivity in 12

patients(15%), Balsam of Peru in 9 patients(12%), Potassium Dichromate and Thiuram mix in 5 patients each(6%), Nickel sulphate in 4 patients(6%), colophony and epoxy resin in 3 patients each(4%). (Graph 1)



Graph 1: Patch test result categorization according to Indian Standard Battery

In Cosmetic and Fragrance series, Thiomersal was a common sensitizer with 8 patients (36%) testing positive for it. Cetrimide was the other common sensitizer with 3 patients (13%) testing positive for it. Propylene glycol sensitivity was seen in 2 patients (8%). (Table 4)

Table 4: Patch test result categorization according to Cosmetic & Fragrance series

Cosmetic & Fragrance	No. of patients	Percentage
Butylated Hydroxytoluene (BHT)	1	5%
Cetyl Alcohol	1	5%
Isopropyl Myristate	1	5%
Jasmine Absolute	1	5%
Rose Oil	1	5%
Sorbic Acid	1	5%
SorbitanSesquioleate (Arlacel 83)	2	8%
Thiomersal	8	36%
Cetrimide	3	13%
Propylene Glycol	2	8%
Kathon CG	1	5%
Total	22	100%

In vegetable series, garlic, chilly, onion and ginger sensitivity was seen in 2 patients (20%) each. Sensitivity to brinjal and potato was seen in 1 patient (10%) each. (Table 5)

Table 5: Patch test result categorization according to Vegetable series

Vegetable	No. of patients	Percentage
Garlic	2	20%
Chilly	2	20%
Onion	2	20%
Ginger	2	20%
Brinjal	1	10%
Potato	1	10%
Total	10	100%

In our study the most common sensitizer in males were Phenylendiamine in 8 patients (16%), followed by Parthenium hysterophorus. in 7 patients (14%), fragrance mix in 7 patients (12%) and potassium dichromate in 5 patients (10%). The most common sensitizer in females were Phenylendiamine in 9 patients (14%), fragrance mix in 8 patients (12%), balsam of peru, thiomersal and Parthenium hysterophorus in 5 patients each (8%) and onion in 2 patients (3%).

Discussion

This study was conducted to assess the usefulness of patch test in identifying hand eczema with newer causative agents and the most likely factors that affects frequency of hand dermatitis.

In the present study, the presentation of hand dermatitis was common in the age group of 31 to 40 years. 34% of our patients presented in this group. Compared to other studies in our study the presentation was higher between 31- 40 years of age group because it is the most active part of life and increased chances of exposure to allergens.

Present study showed mean age of 42.2 years and male mean age 45.8 years and female mean age 39.2 years. Our patients total mean age is higher than Kishore NB et al. [5] (30.95 years), Goh CL et al. [6] (32.5 years) and Skoet R et al. [7] (36.1 years). (Table 6)

Table 6: Comparison of mean age distribution with other studies

Sl. No	Studies	Males/ yrs	Females/ yrs	Total
1	Skoet R et al.[7]	37.1	35.1	36.1
2	Goh CL et al.[6]	34	31	32.5
3	Kishore NB et al.[5]	33.7	28.2	30.9
4	Present study	45.8	39.2	42.2

Our male patients mean age is higher than Goh CL et al.[6] (34 years), Kishore NB et al. [5] (33.7 years), Skoet R et al. [7] (37.1 years). Our female patients mean age is higher than Goh CL et al. [6] (31 years), Kishore NB et al. [5] (28.2 years), Skoet R et al. [7] (35.1 years).

Men and women were almost equally affected in our study (45% and 55% respectively) as compared to some studies. In an analysis of 4825 patients patch tested in eight European Centers, the International Contacts Dermatitis Research group found that the hands alone were involved in 36% of males and 30% of females. [8]

In the present study, females relatively outnumbered males at the ratio of 0.8:1 as similar to Diepgen TL et al. [9] (1:1.5) and Bajaj AK et al. [10] (1:1.5). Females are more commonly involved than males, possibly because of increased exposure to wet work and household chemicals. [11]

The incidence of housewives being affected with hand dermatitis was 63% in the present study which is in accordance with study by Sharma VK et al. [12] 66.6% and Kishore NB et al. [5] 68.2%. It is due to exposure of housewives to household chemicals, detergents, soaps, cosmetics that may be irritant in nature as well vegetables allergens.

While male unskilled workers showed an incidence of 49% compared to study by Sharma VK et al. [12] 40.42% and Kishore NB et al. [5] 53.6%. Unskilled workers maybe agriculturists, masons, cooks experiencing unprotected exposure to various chemical on a regular basis, therefore more prone to hand dermatitis.

In the present study most number of cases

presented with hyperkeratotic eczema 46(46%) which was higher than Kishore et al. [5] 5 (10%). The second most common was pompholyx (17%) which was higher than Kishore NB et al. [5] (8%) Other common variants like recurrent focal palmar peeling (16%) was lesser than Kishore et al.[5] (22%).

Wear and tear dermatitis (4%), patchy vesiculosquamous eczema (1%) is lesser than Kishore NB et al. [5] 8%, 28% respectively. Discoid eczema was not observed in our study group although Kishore NB et al.[5] had 3(6%) cases.

Our study observed a 58% positive result for patch test, it was lower Bajaj AK et al. [10] 57(80.28%), Kishore NB et al. [5] 41 (82%) and Sharma VK et al. [12] 64(80%)

Our study showed 21% patients positive for single antigen and it is lesser in comparison with Kishore NB et al. [5] (64%). Multiple antigens positive response was 37% and it was higher than Kishore NB et al. [5] (2%).

In our study Phenylenediamine was the most common sensitizer with 22%, our findings were higher than Shenoi SD et al.[13] (0.9%) and Hald M et al. [14] (2.9%), next common was fragrance mix (18%) which was higher than Shenoi SD et al. [13] (6.1%), Hald M et al.[14] (11.4%) and Kishore NB et al. [5] (8%). Balsam of peru (12%) was higher than Shenoi SD et al. [13] (3.3%) and Kishore NB et al [5] (8%). Potassium dichromate (6%) was lesser than Shenoi SD et al. [13] (11.3%) and Kishore NB et al. [5] (32%). Nickel Sulphate (6%) was lesser than Shenoi SD et al. [13] (10.8%), Hald M et al [14] (19.4%) and Kishore NB et al. [5] (18%).

In the present study, sensitivity to

thiomersal was 36% which was higher than Pramod Kumar et al. [15] (20%) and lower than Nath AK et al. [16] (77.1%). Sensitivity to Cetrimide was 13% which was lower than Pramod Kumar et al. [15] (28%).

In the present study, sensitivity to Garlic, chilly and onion was 20% each which was lower than Goyal S et al. [17] (60%, 25%, 50%) respectively. Sensitivity to potato was 10% which was lower than Goyal S et al. [17] (12.5%). [18]

Conclusion

A higher occurrence of hand dermatitis was observed in females who were mostly housewives, as they were more frequently exposed to soaps, detergents and vegetables. The most common morphological form in our study was hyperkeratotic palmar eczema followed by pompholyx. The common sensitizer in Indian Standard Battery was phenylenediamine, in Cosmetic and Fragrance Series it was Thiomersal and cetrimide and in vegetable series it was garlic, chilly, onion and ginger. Patch testing is an important investigative tool in diagnosis of hand dermatitis.

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