



Patch test positivity in hand eczema

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Abstract

Background: Hand eczema is a common condition encountered in dermatology. It is caused due to various endogenous and exogenous factors. Various morphological forms of hand eczema have been described. Patch testing is the standard method to identify the allergen responsible for the eczema.

Aims: To find out the proportion of patch test positivity in hand eczema patients and to find out the most common allergen in hand eczema. The secondary objective was to study the morphological pattern of hand eczema.

Materials & Methods: This was a cross-sectional study involving 56 hand eczema patients conducted between January 2016 and December 2016, at a tertiary care centre in Southern India. After a detailed history including history of occupational exposure and detailed examination, patch test was done on these patients with Indian standard series. The patches were removed after 48 hours. Another reading was taken after 96 hours. The readings were interpreted according to International Contact Dermatitis Research Group criteria and noted down. The data collected were analysed in terms of descriptive statistics.

Results: Majority of the patients belonged to the group of housewives (28.6%) and masons (23.2%). Most of the patients had a non-specific morphological pattern of hand eczema (66.1%) followed by wear and tear dermatitis (16.1%). Patch test positivity was seen in 60.7% of the patients and the most common allergen was potassium dichromate (20.8%) followed by nickel sulphate (17%) and thiuram mix (15.1%). A high degree of clinical correlation could be made out between the allergens positive and allergen suspected (82.3%).

Conclusions: Hand eczema most commonly involved housewives and masons. Patch testing helped in finding out the suspected allergens in majority of the patients thereby enabling a holistic management of the patients with hand eczema.

Keywords: hand eczema, contact dermatitis, patch test.

Introduction

Hand eczema is a type of endogenous eczema in which the dermatoses is largely confined to the

hands, with only minor involvement of other areas.¹ It is a common distressing condition giving rise to a lot of emotional and physical morbidity.²

Various exogenous and endogenous factors are implicated in the development of hand eczema. It is estimated that about 2-10% of population is likely to develop hand eczema at some point of time.³ Different morphological types of hand eczema described are: apron eczema, chronic acral dermatitis, nummular eczema, fingertip eczema, gut eczema, hyperkeratotic palmar eczema, pompholyx, recurrent focal palmar peeling, ring eczema, wear and tear dermatitis, and others.¹ Patch testing is the diagnostic tool for allergic contact dermatitis. It is a simple and efficient method for finding out the culprit allergen. The frequency of contact sensitization in hand eczema varies from 63-89%.^{2,4,5}

Since optimal treatment is based on accurate advice about identification and prevention of allergens, regular patch testing becomes imperative. Avoidance of the allergen, if implicated, is important in the management of hand eczema.

Materials and Methods

This was a cross-sectional study conducted between January 2016 and December 2016, at a tertiary care centre in Southern India. The study was done after obtaining approval from the institutional ethics committee. Consecutive patients above the age of 12 years with hand eczema attending the Department of Dermatology, Venereology and Leprosy, who had given consent to participate in the study, were included in the study. Patients who had received oral steroids in the past 2 weeks and patients who were pregnant or lactating were excluded from the study.

Procedure

After informed consent, detailed history including history of occupational/personal exposure to chemicals, history of atopy and detailed examination findings with area of involvement, morphology and final diagnosis were noted down in the proforma. Patch testing was done on these patients with Indian standard series, approved by Contact and Occupational Dermatoses Forum of India (CODFI) marketed by Systopic Laboratories

Pvt. Ltd., New Delhi with 20 allergens. The patches were removed after 48 hours. The reading was taken one hour after removal of the patches, to allow the erythema to subside. A second reading was taken after 96 hours. The readings were interpreted according to International Contact Dermatitis Research Group criteria.

The data collected were analysed using descriptive statistics.

Results

There was a slight male preponderance with the male to female ratio 1.07:1. The mean age of the patients was 40.6 years and maximum patients were in the age group 35-44 years (35.7%). Out of the 56 participants, 16 of them were housewives (28.6%), followed by 13 masons (23.2%), 7 nursing assistants (12.5%), 4 students (7.1%) and 4 farmers (7.1%) (Table 1). Other less common occupations encountered among the hand eczema patients were office workers, painters, nurse, tile worker, cattle rearing, jewellery salesman, marble factory worker, driver and army personnel.

Table 1- Occupation

Occupation	Frequency	Percent
Mason	13	23.2
Housewife	16	28.6
Nursing assistant	7	12.5
Painting	2	3.6
Office work	3	5.4
Student	4	7.1
Farmer	4	7.1
Nurse	1	1.8
Miscellaneous	4	7.1
Tile worker	1	1.8
Cattle rearing	1	1.8
Total	56	100.0

The mean duration of symptoms was 42.3 months (range 1 month to 19 years). Twenty four patients (42.9%) gave a personal history of atopy. Most of patients (18 out of 56; 32.1%) gave history of exacerbation with exposure to detergents. A history of aggravation with exposure to cement was present in 15 patients, to rubber products and food handling in 9 patients each, gardening in 6 patients, chemicals in 6 patients, artificial jewellery/safety pins in 4 patients, and a minority

had exacerbation with exposure to glove dust, cosmetics, hair dye and plastics.

Sixteen percentage of the patients had wear and tear dermatitis, 14.3% had pompholyx, 3.6% had fingertip eczema and 66.1% of patients could not be classified into any specific category.

Out of the 56 participants, 34 participants (60.7) had a positive patch test. Potassium dichromate was the most common allergen identified in 11 (20.8%), followed by nickel in 9 (17%) and thiuram mix in 8 (15.1%). Cobalt and fragrance mix showed positive reaction in 5 patients (9.4%) each (Table 2).

Table 2 Allergens positive in patch test

Allergens	Frequency	Percent
Perubalsum	1	1.9
Formaldehyde	3	5.7
Mercaptobenzthiazole	3	5.7
Potassium dichromate	11	20.8
Nickel sulphate	9	17.0
Cobalt sulphate	5	9.4
Epoxy resins	2	3.8
Paraphenylenediamine	2	3.8
Parthenium	2	3.8
Neomycin sulphate	1	1.9
Fragrance mix	5	9.4
Thiuram mix	8	15.1
Black rubber mix	1	1.9

Multiple allergen positivity was seen in 23.2% of the study group.

Among women the most common sensitizer was nickel sulphate in 6 patients (33.3%). The most common allergen among males in the present study was potassium dichromate in 11 patients (30.6%).

A total of 34 patients gave a positive patch test result. Of these, 28 patients (82.3%) correlated with clinically suspected allergens (Table 4). Out of the 13 patients with cement as the suspected agent, 11 (84.6%) showed positivity to potassium dichromate. Rubber was the second commonest suspected agent in 7 (20.6%) cases. Of these 7 cases, 5 (71.4%) showed positive patch result to thiuram mix, 2 (28.6%) to mercaptobenzthiazole and 1 (14.3%) to black rubber mix. Out of this one patient showed positivity to both mercaptobenzthiazole and thiuram mix.

Other allergens found to be positive were Nickel sulphate, Thiuram mix, Cobalt chloride, Fragrance mix, Formaldehyde, Mercaptobenzthiazole, Black rubber mix, Epoxy resin, PPD, Parthenium and Perubalsam.

Table 3 Clinical correlation between suspected material and allergen positive in patch test

Sl.No	Suspected material	Positive allergen found	Clinical correlation
1	Rubber	Mercaptobenzthiazole	Present
2	Glove dust	Perubalsam	Absent
3	Cement	Potassium dichromate	Present
4	Detergents	Potassium dichromate	Present
5	Cement	Potassium dichromate	Present
6	Soaps Detergents, Cosmetics, Rubber	Fragrance mix, Thiuram mix	Present
7	Plastics, polishes	Formaldehyde	Present
8	Safety pins, artificial jewellery	Nickel	Present
9	Cement	Nickel	Absent
10	Factory worker(marble)	Epoxy resins	Present
11	Cosmetics	Fragrance mix	Present
12	Soaps	Nickel, Parthenium	Absent
13	Cement	Mercaptobenzthiazole	Absent
14	Cement	Potassium dichromate, Cobalt	Present
15	Cement	Potassium dichromate	Present
16	Detergents	Fragrance mix	Present
17	Rubber	Black rubber mix	Present
18	Cement, rubber	Potassium dichromate, Thiuram mix	Present
19	Cement, factory worker (tile)	Potassium dichromate, Epoxy resins	Present
20	Detergents	Nickel	Absent
21	Safety pins, needles, artificial jewellery	Nickel	Present
22	Chemicals (turpentine)	Fragrance mix	Absent
23	Cement	Potassium dichromate	Present
24	Cement	Potassium dichromate	Present
25	Rubber	Thiuram mix	Present
26	Rubber	Thiuram mix, Mercaptobenzthiazole	Present
27	Artificial jewellery	Nickel	Present
28	Chemicals (housecleaning product)	Formaldehyde	Present
29	Gardening	Parthenium	Present
30	Hair dye	PPD	Present
31	Cement, Rubber	Potassium dichromate, Cobalt, Thiuram mix	Present
32	Cement	Potassium dichromate	Present
33	Cement, Rubber	Potassium dichromate, Thiuram mix	Present
34	Needles	Nickel	Present

Discussion

There is a slight male preponderance with male to female ratio 1.07:1. Indian studies by Handa et al² (2:1) and the study by Laxmisha et al⁶ showed a male predominance (5:1) similar to the my study. In the studies done by Charan et al⁷ (1:1.09) and by Majid⁸ there was a female predominance (1:1.6). This shows that gender ratio varies greatly between studies and that both men and women are equally susceptible to the development of hand eczema.

Housewives comprised 28.6% of the study group followed by masons which came upto 23.2%. The work environment in certain high risk occupations such as cleaning and construction is particularly associated with a greater incidence of hand eczema. Housewives and masons constituted a large proportion in many studies. In the study done by Suman et al⁹ housewives comprised 37% and masons comprised 14% of the study group. Similarly in the study done by Handa et al², housewives constituted 81.8% while and 32.8% were masons. Housewives were the majority group (45.6%) in the study by Charan et al.⁷

Unspecified eczema accounted for 66.1% in our study which was in accordance with the study done by Handa et al² (62%). This points out the fact that morphological classification of all patients of hand eczema is not always possible. Housewives were the major group in our study and wear and tear dermatitis accounted for 16.1% of our study similar to the study by Charan et al⁷.

In our study, patch test was positive in 60.7%. The positivity varies in different studies from 37% to 82%.^{10,9,12,13}

The most common allergen in the present study was potassium dichromate (20.8%) followed by nickel sulphate (17%) and thiuram mix (15.1%) patients. In the study done by Handa et al² and also in the study by Laxmisha et al,⁶ the most common allergen was potassium dichromate (25% and 52.78% respectively). Exposure to chromates can occur in a variety of items used daily such as bleaching agents, detergents, cement, paints, and polish. Patients in our study had significant

occupational exposure to chromates, which increases the risk of contact sensitivity to chromates, which could explain the high number of positive patch test reactions to potassium dichromate noted by us. Among the 13 masons, 11 showed a positive reaction to potassium dichromate and 2 were patch test negative. Contact dermatitis by cement can occur either due to the presence of allergens or due to their alkaline nature and abrasive properties of silica particles. This could be the reason for the negative patch test reaction in the two who had the history of contact with cement.

The second commonest allergen in our study was nickel sulphate (17%). Nickel has been reported as the most common allergen in several Indian studies.^{10,12,8} Nickel sensitivity is a common sensitizer among women as seen in the studies done by Vigneshkarthik et al,¹⁰ Majid⁸ and Handa et al.²

The most common allergen among males in the present study was potassium dichromate (30.6%). Among women the most common sensitizer was nickel sulphate (33.3%). A similar result was seen in the study by Trehan et al.¹⁴

10 out of 16 housewives in the study group gave a negative patch test result. The low yield of positive patch test results here maybe due to the fact that housewives are exposed to a large number of allergens in day-to-day life, all of which may not be present in the Indian standard battery of allergens used in the study.

Among the 34 patients with patch test positivity, 82.3% (28 patients) correlated with clinically suspected allergen. A patient with suspected allergy to turpentine gave a positive patch to fragrance mix which could not be correlated clinically. This may be because, the major contact allergen of turpentine, delta-3-carene hydroperoxide, is not included in the standard series of allergens used in our study. Also a study done in Germany¹⁵ showed that patients sensitized to turpentine had increased rates of additional sensitizations. The high rates of positive reactions to fragrances may be explained by group or cross

allergies to terpene hydrocarbons. These are the main components of turpentine, and are widely used in the perfumery industry as starting materials for fragrances.¹⁶

Multiple allergen positivity was seen in 23.2% of the study group.

The importance of doing the patch test in hand eczema lies in the fact that finding out the causative allergen will help in the efficient management of hand eczema. Absence of any serious side effects in our patients demonstrates that patch test is a non-invasive and safe diagnostic procedure.

Conclusions

Hand eczema is one of most chronic distressing dermatological condition in the population. Unspecified eczema accounted for 66.1% in our study which emphasizes the fact that that morphological classification of all patients of hand eczema is not always possible. A high degree of patch test positivity (60.7%) was seen in our patients and the Indian standard series proved to be very useful. The most common allergen was potassium dichromate (20.8%) followed by nickel sulphate (17%) and thiuram mix (15.1%). Out of the 34 positive patch test result patients, 28 (82.3%) could be clinically correlated thus aiding in the final diagnosis and holistic management of the cases.

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