

Research Article

A study of patch testing in subjects with hand eczema of different occupational groups

Harshit T. Bhachech, Chandra Shekhar R. P. Jaiswal*, Hita Hemant Mehta

Department of Dermatology, Venereology & Leprosy, Government Medical College and Sir T Hospital, Bhavnagar, India

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***Correspondence:**

Dr. Chandra Shekhar R. P. Jaiswal,

E-mail: samudra00747@hotmail.com

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ABSTRACT

Background: Hand dermatitis is a common dermatological disorder in different occupational groups. Patch Testing serves as an important tool for identifying allergens responsible for contact dermatitis.

Methods: A study of patch testing was conducted in patients of hand eczema of different occupational groups with aim to identify allergens for particular occupational groups. Study was conducted as an observational study of patch testing in patients of hand eczema who attended skin OPD in our hospital in one year duration. After detailed history and complete examination, patch testing was done by Indian Standard Series in 45 Patients of hand dermatitis. There were eight farmers, eight masons, five housewives, four diamond workers, eight miscellaneous labourers and 12 patients of varied non-specific occupations. Grading was done using ICDRG criteria at 48 and 72 hrs.

Results: Among 45 patients, 35 were male and 10 female. Positive patch test was seen in 62.2% of patients with parthenium being the most common allergen (27%), followed by potassium dichromate (18.2%). There were extreme positive results in five, strong positive in ten and weak positive in rest positive results. 87.5 % occupation-allergen correlation was seen in farmers followed by 50 % among masons. Only two patients showed variation in reading between 48 hr and 72 hr.

Conclusions: Our study showed good correlation between occupation and positive patch test especially among farmers and masons. Many other non-specific allergens were also found positive and exposure to those can be prevented to avoid hand eczema in different occupational groups.

Keywords: Occupational groups, Hand eczema, Patch testing

INTRODUCTION

Hand dermatitis is one of the common problems dealt by dermatologist. Because of exposure to various contact allergens occupation is important factor for development of hand eczema. Reportedly, eczema of hand is most common occupational dermatoses in Denmark comprising of around 90% to 95% of subjects.¹ Overall prevalence of hand eczema has been reported 2% to 10%.² Apart from some specific allergens in each

occupational group, the patient may be exposed to any other non-specific allergen.^{3,4}

Epicutaneous Patch test is considered as a gold standard method for diagnosis of allergic contact dermatitis and it may serve as a helpful tool for confirming the suspected allergen in any specific occupational group and also finding any other non-specific allergen.^{5,6} Avoiding the exposure to such allergens can prevent the morbidity of recurrent episodes of eczema.⁶ We conducted a study of patch testing in patients of chronic hand eczema and

analyzed the results in each occupational group using Indian standard series for patch testing (Table 1).

Table 1: List of allergen used in this study (Indian standard series).

No.	Allergen
1	Vaseline (control)
2	Parthenium
3	Phelene diamine
4	Balsum of peru
5	Formaldehyde
6	Mercaptobenzothiade
7	Potassium dichromate
8	Cobalt sulphate
9	Nickel sulphate
10	Colophony
11	Benzocaïne
12	Epoxy resin
13	Paraben mix
14	Black rubber mix
15	Nitrofurazon
16	Thiuram mix
17	Fragrance mix
18	Chlorocresol
19	Wood alcohol
20	Neomycin sulphate

METHODS

After receiving approval from Institutional Review Board (IRB) and Human ethics committee, we conducted a study of 45 patients with hand dermatitis of varied occupational groups in a tertiary health care centre (Table 2). Study duration was 12 months. The patient age ranged 15 to 55 years with a defined occupation like farmers or masons or labourers of both genders and housewives or doing any other random occupation, who have eczema on hand, were included. Patient with infected skin lesion involving hand associated with hand eczema, non-compliant patients and patient on systemic corticosteroid and/or antihistaminic drugs were excluded from study.

Detailed history including occupational and contact to any specific allergens of each patient was taken. After performing clinical examination, all study subjects were explained about patch testing and written informed consent was taken from each of them.

The patient was withdrawn from systemic corticosteroids and anti-histaminics 48 hours prior to patch testing. Patch testing was done with 20 allergens of Indian Standard Series (Table 1) comprising of 16 semisolid, three liquid preparations of allergens and one control, as approved by the Contact and Occupational Dermatoses Forum of India (CODFI). Semisolid allergens were applied on the skin surface of back or lateral aspect of arms of the subjects with the help of 5 mm aluminium chambers pre-fixed on

micropores while liquid allergens applied were applied with one full drop of preparation soaked in tissue paper and was put in aluminium chamber. Two micro-pore strips, having ten allergens on each strip, were applied on disease free area.³ Proper advice regarding avoidance of anti-allergic medications and care of patch test site was given. Readings were taken at 48 hrs and 72 hrs and graded as per International Contact Dermatitis Research Group (ICDRG) criteria in extremely positive, strong positive, weak positive and doubtful.³ pre and post-test photograph were taken from each patient for records and further use.

As, this study was conducted as an observational study, so only proportions were calculated in the form of percentage.

RESULTS

A total of 45 patients of different occupational groups with hand dermatitis were tested with patch testing, out of them 35 subjects were male and ten were female. At least one allergen was positive in 28 patients (62.2%). Based on ICDRG criteria there were five extreme positive, ten strong positive and 28 weak positive results (Table 3).⁵ In major occupational groups, all farmers were found allergic to at least one allergen positive (100%) while seven out of eight masons (87.5%) were found to be positive to one allergen atleast (Table 2). In our study, parthenium in farmers (Figure 1), potassium dichromate in masons (Figure 2) and paraben mix in miscellaneous occupational group were observed to be more common in respective occupations. Diamond workers, housewives and other labourers showed positive patch tests with different allergens individually but no single predominant group specific allergen could be determined.

Table 2: Occupational groups with proportion of positivity in patch test.

Occupational group	Number of patients	Positive (percentage)
Farmers	8	8 (100%)
Masons	8	7 (87.5%)
Diamond workers	4	1 (25%)
Housewives	5	2 (40%)
Other laborers	8	4 (50%)
Miscellaneous occ.	12	6 (50%)
Total	45	28 (62.2%)

Among the allergens, parthenium was the most common allergen (27%) subsequently potassium dichromate (18%) and paraphylenediamine (11%) were common to give positive patch test results. There were five extreme results noted in our study and all of that were positive with parthenium only (Figure 3) while among ten strong positive results two predominant allergens were parthenium and potassium dichromate to show positive and in three patients each while thiuram mix, fragrance

mix, neomycin and colophony were other less common allergens associated with strong positive results (Table 4).

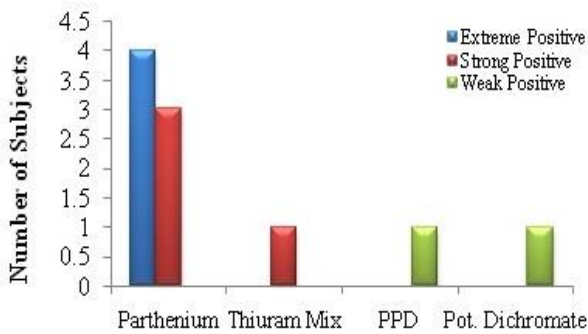


Figure 1: Patch test results in farmers.

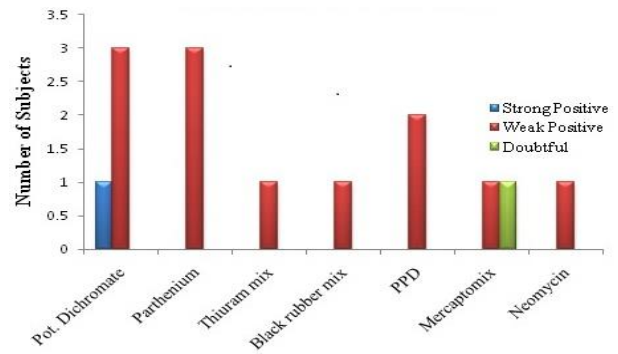


Figure 2: Patch test results in masons.

We calculated occupation-allergen co-relation for each group with maximum co-relation found in farmers (87.5%) followed by masons (50%) (Table 5).

Table 3: Classification of positive results in various occupation groups according to ICDRG criteria.

Occupational group	Extreme positive	Strong positive	Weak positive	Doubtful
Farmers	4	4	2	0
Masons	0	1	12	1
Diamond Workers	1	2	0	0
Housewives	0	0	3	1
others Labourers	0	3	3	0
Miscellaneous	0	0	8	0
Total	5	10	28	2

Table 4: Classification of positive results with allergens according to ICDRG criteria.

Allergen	Extreme positive	Strong positive	Weak positive	Doubtful	Total
Parthenium	5	3	4	0	12
Thiuram Mix	0	1	1	0	2
Para-phenylenediamine (PPD)	0	0	5	0	5
Pot. Dichromate	0	3	5	0	8
Nickel	0	0	1	0	1
Fragrance Mix	0	1	2	1	4
Paraben	0	0	3	0	3
Black Rubber Mix	0	0	1	0	1
Mercaptomix	0	0	2	1	3
Neomycin	0	1	1	0	2
Chlorocresol	0	0	1	0	1
Colophony	0	1	0	0	1
Benzocaine	0	0	1	0	1
Epoxy Resin	0	0	1	0	1

Table 5: Concordance of suspected allergen and positive allergen.

Occupational group	Suspected allergen	Positive allergen	Percentage of Co-relation
Farmers (8)	Parthenium	Parthenium (7) Thiuram Mix, Potassium dichromate	87.5
Masons (8)	Potassium Dichromate	Potassium dichromate (4) Parthenium. PPD, Thiuram mix, Black rubber mix, Mercaptomix, Neomycin	50
Diamond workers (4)	Cobalt	Fragrance mix, parthenium, Potassium Dichromate	0
Housewives (5)	Nickel	Nickel (1), fragrance mix, Parabens, PPD	20

PPD – Para-phenylenediamine



Figure 3: A case of lichenoid hands eczema allergic to parthenium dermatitis.

DISCUSSION

Allergic contact dermatitis of hands and chronic hand eczema are commonly dealt cases in skin clinic.⁵ It not only hinders daily activities of patient but also decreases work efficacy which may lead to change in occupation or even handicap.⁷ During routine work many allergens are encountered that may lead to sensitization and later dermatitis. Exposure to these allergens can be occupational or non-occupational.

The exposure to certain allergens is more common in certain occupations like farmers are more exposed to parthenium due to more exposure to weeds.⁸ Similarly potassium dichromate in masons, nickel in housewives and cobalt in diamond workers are commonly encountered allergens.^{4,6,9,10} Apart from these specific allergens the patient may be exposed to other non-specific allergens based on work or household environment. In Suman et al household (37%) work was most common occupation followed by masonry (14%) while in Skoet et al observed health care, bakery, hair dressing and kitchen work were associated more with hand eczema.¹ In our study farmers (18%), masons (18%) and other labourers (18%) were more common.

Our study showed a 62.2 % positive result of patch testing which is lower compared to Chandrashekhar Laxshmi et al (82%) and higher compared to Kishore NB et al (52.8%) but in various studies positive patch test ranged 46.7% to 82% has been reported.^{1,3,4} In above said two studies and in a survey in Denmark, the most common allergen found to be positive was potassium dichromate, while in our study parthenium was predominant positive allergen.^{1,3,4} Apart farmers we had five non farmer subjects (masons and diamond workers) with hand eczema who were allergic to parthenium. This higher sensitivity to the allergen may be due presence of allergen near residential environment of the patient as many of the patients were from villages where parthenium commonly grows.

An interesting observation of our study was the presence of clinically hypertrophic and lichenoid eczema of hands more commonly in parthenium sensitive subjects (Figure 4). Eczemas of feet and face were also more commonly be associated with parthenium positivity this may suggest that air-borne contact dermatitis is more common with this particular allergen.⁸



Figure 4: Extreme positive result in patch testing with parthenium.

There were 14 cases with more than one allergen positive in patch testing and we found that most common combination of allergens was parthenium with potassium dichromate. The significance of such a combination of positive testing can be verified only through further studies as such coexistence may probably be due to overall higher positivity and ubiquity of these allergens.

CONCLUSION

In this study parthenium sensitivity was noted in seven out of eight farmers with hand eczema and most of them were extremely and strongly positive and Potassium Dichromate in 50% of masons although most of them were weak positive. So there is some correlation between farmer occupation and positive parthenium sensitivity and masonry to Potassium Dichromate sensitivity. Other occupations did not show such higher positive results with suspected allergens. These findings suggest that hand eczema may have occupational co-relation but there are other factors like household allergen exposure and individual susceptibility which should also be considered. Thus patch testing serves as a reliable non-invasive method for the confirmation of sensitivity of any allergen based on occupation and also to find any other allergen not specific to that particular occupation.

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Conflict of interest: None declared

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