STUDY OF CONTACT SENSITIZATION AND ITS PATTERN IN PATIENTS OF HAND ECZEMA

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ABSTRACT

BACKGROUND

Hand eczema is a common problem with multifactorial etiology. Both endogenous factors like atopy, stress and exogenous factors like contact with irritants and allergens have been incriminated in its causation and aggravation.

OBJECTIVES

To study the contact sensitization and its pattern in patients of hand eczema and association of contact sensitivity with severity of hand eczema.

METHODOLOGY

This study was conducted among 80 patients of hand eczema, from 1st January 2015 to 31st December 2015 in the Department of Dermatology, Venereology and Leprosy, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun. Patients were patch tested with Standard Indian patch test battery as approved by the Contact and Occupational Dermatoses Forum of India (CODFI).

RESULTS

Of the 80 patients, 43 (53.8%) were males and 37 (46.2%) females, with a male to female ratio of 1.16:1. Most of our patients (56.2%) belonged to 21-40 years of age group. Hyperkeratotic eczema (36.3%) was the most common type of HE followed by housewife eczema (26.3%), pompholyx (12.5%), fingertip eczema (8.8%), patchy vesiculosquamous and unspecified eczema (6.2%) each, recurrent focal palmar peeling (2.5%), and ring eczema (1.2%). Patch test to one or more allergen was positive in 42 patients (52.5%). Potassium dichromate was the most common sensitizer in our study, followed by nickel, fragrance mix, PPD, wool alcohol and balsum of Peru, parthenium, cobalt.

CONCLUSION

Contact sensitivity was found to be present in 52.5% of cases of hand eczema in our study. However, no significant association was observed between contact sensitivity and severity of the disease.

KEYWORDS

Hand eczema, Pattern, Contact sensitization, Allergens.

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BACKGROUND

Hand eczema (HE) by definition implies that the eczema is largely confined to hands. It is one of the most frequently seen diseases in dermatological practice causing severe physical and emotional distress.[1]

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It is the most common form of occupational skin disease.[2] Occupations, which involve wet work and exposure to various chemical agents, like masons, industrial workers, farmers, labourers are at higher risk for developing hand dermatitis.[3]

There are various morphological patterns of hand eczema like hyperkeratotic palmar eczema, pompholyx, recurrent focal palmar peeling, housewives eczema, fingertip eczema, ring eczema, apron eczema, chronic acral dermatitis and gut eczema. HE is often wrongly diagnosed as other skin dermatoses such as psoriasis and dermatophytosis. The pathogenesis of HE is often complex. Various endogenous and exogenous factors have been implicated in the development of HE, of which atopy and contact sensitization to various allergens, have been largely studied over the years. A variable frequency of contact

sensitivity, ranging from 23% in mild cases[4] to 62% in severe cases,[5] has been reported.

Patch testing is considered mandatory in all patients of hand eczema lasting for more than four weeks in order to identify a specific cause, if present, and counsel the patients accordingly.[6]

This study was undertaken to evaluate the pattern of contact sensitivity in patients of HE and its implications on HE severity. Identification of contact sensitizer helps in the management of HE patients by adopting appropriate preventive and therapeutic measures.

MATERIALS AND METHODS

This study was carried out at Department of Dermatology, Venereology and Leprosy, Himalayan Institute of Medical Sciences, Swami Ram Nagar, Dehradun, over a period of twelve months, from 1st January 2015 to 31st December 2015. All new, consecutive patients of hand eczema, regardless of age and sex, who presented to contact dermatitis clinic of Out Patients Department (OPD), were recruited for the study after obtaining written informed consent. Permission of institutional thesis committee and ethical committee had been obtained before starting the study. Patients with acute hand eczema were enrolled after acute episode had subsided and those on systemic steroids were included after daily dose had been reduced to less than 20 mg of prednisolone. Exclusion criteria included pregnancy, primary irritant contact dermatitis, hand eczema with predominant involvement of other body parts. Patients with dermatophytosis, psoriasis and scabies of hands were excluded clinically and with investigations like KOH examination and skin histopathology, as required.

A detailed demographic profile, occupation, history regarding onset of disease, duration, progress of hand dermatitis, aggravating and relieving factors, seasonal variations, presence of atopy in self or family, day to day work, hobbies, and past and present treatment was recorded. A note was also made of symptoms and signs like itching, erythema, discharge, infiltration and pain. Morphological classification of hand eczema was done into different categories, described earlier. Severity of hand eczema was assessed objectively, in each case, using hand eczema severity index (HECSI).[7]

All the patients were patch tested with standard Indian patch test battery as approved by Contact Dermatitis and Occupational Dermatoses Forum of India, and supplied by systopic India Limited Delhi. Patch test battery comprised of 20 antigens supplied readymade. List of antigens included in study is given at Table-1.

Sl. No.	Compound	Concentration (%)	Vehicle
1.	Control (petrolatum)	100%	Petrolatumo (Pet)
2.	Potassium dichromate	0.1%	Pet
3.	Neomycin sulphate	20%	Pet
4.	Cobalt chloride	5%	Pet
5.	Benzocaine	5%	Pet
6.	PPD (p-phenylenediamine)	1%	Pet
7.	Parabens mix	9%	Pet
8.	Nickel sulphate	5%	Pet
9.	Colophony	10%	Pet
10.	Epoxy resin	1%	Pet
11.	Fragrance mix	8%	Pet
12.	Mercaptoben-zothiazole	1%	Pet
13.	Nitrofurazone	1%	Pet
14.	Chlorocresol	1%	Pet
15.	Wool alcohol	30%	Pet
16.	Myroxylonpereirae / balsum of peru	10%	Pet
17.	Thiuram mix	1%	Pet
18.	Black rubber mix	0.6%	Pet
19.	Formaldehyde	2%	Pet
20.	Parthenium	15%	Pet

Table 1. List of Indian Standard Battery Antigens Used in the Study

Patches were applied to upper part of back of the patient. Patch test reading were taken after 48 hrs., 72 hrs. and one week of patch testing and interpreted according to the International Contact Dermatitis Research Group criteria.[8]

The data was analysed using chi-square test. Binary logistic regression was used to find the strength of association between patch test and various factors. The odd ratio with its 95% confidence interval (CI) was calculated. The p-value <0.05 was considered significant. All the analysis was carried out on SPSS 16.0 version (Chicago, Inc., USA).

RESULTS

A total of eighty consecutive patients of hand dermatitis, who fulfilled the inclusion criteria, were enrolled for the study. Age and gender distribution of study subjects is shown in Table-2. Forty three patients (53.8%) were males and 37 (46.2%) females, with a male to female ratio of 1.16:1. More than half of the subjects were between age group 21-40 years (56.2%), followed by 41-60 years (30%), ≤20 years (10%) and >60 years (3.8%). Youngest patient was of 12 years and the oldest of 65 years age.

Age, Gender	No. (n=80)	Percentage (%)
Age in Years		
≤20	8	10.0
21-40	45	56.2
41-60	24	30.0
>60	3	3.8
Gender		
Male	43	53.8
Female	37	46.2

Table 2. Demographic Distribution of Study Subjects (n=80)

Occupational breakup of study subjects is given in Table-3. Overall, housewives formed the largest group constituting 26.2% of the subjects. Mason were 21.2% and students 13.8%. Industrial workers were 12.5% and farmers were 10%.

Occupation	Male		Female		Total (n=80)	
	No.	%	No.	%	No.	%
Housewife	0	0.0	21	100.0	21	26.2
Mason	17	100.0	0	0.0	17	21.2
Farmer	8	100.0	0	0.0	8	10.0
Student	4	36.4	7	63.6	11	13.8
Labourer	0	0.0	4	100.0	4	5.0
Industrial worker	10	100.0	0	0.0	10	12.5
Office worker	1	16.7	5	83.3	6	7.5
Others	3	100.0	0	0.0	3	3.8

Table 3. Distribution of Study Subjects According to Occupation

In more than half of the patients (61.2%), no personal history of atopy was found. However, history of allergic rhinitis (AR) was seen in 17.5% subjects and atopic dermatitis (AD) in 12.5% subjects. Personal history of bronchial asthma (BA) was present in 8.8% of the subjects. Family history of atopy was absent in majority of the subjects (90%).

The aggravating factors, as told by patients, were soap, detergent, vegetables, chemicals and cement. Out of 80 patients, 20 (25%) gave history of aggravation on contact with detergents, 14 (17.5%) with soaps, 20 (25%) with cement, 2(2.5%) and 3 (3.8%) with vegetables and chemicals, respectively.

Morphological patterns of hand dermatitis observed in our study is depicted in Table-4. Overall, hyperkeratotic eczema was the most common hand eczema (36.3%) followed by wear and tear dermatitis (26.3%), and pompholyx (12.5%). No case of apron eczema, chronic acral eczema and gut eczema was seen.

Type of eczema	Male		Female		Total (n=80)	
	No.	%	No.	%	No.	%
Fingertip eczema	2	28.6	5	71.4	7	8.8
Wear & tear dermatitis (housewife)	0	0.0	21	100.0	21	26.3
Hyperkeratotic eczema	25	86.2	4	13.8	29	36.3
Patchy vesiculosquamous eczema	5	100.0	0	0.0	5	6.2
Pompholyx	5	50.0	5	50.0	10	12.5
Recurrent focal palmar peeling	1	50.0	1	50.0	2	2.5
Ring eczema	1	100.0	0	0.0	1	1.2
Unspecified eczema	4	80.0	1	20.0	5	6.2

Table 4. Morphological Types of Hand Eczema in Study Subjects

Distribution of study subjects according to HECSI scores is shown in Table-5. Overall, HECSI score <40 was in 40% subjects followed by 40-60 in 35% and >60 in 25% patients.

HECSI Scores	Male		Female		Total (n=80)	
	No.	%	No.	%	No.	%
<40	8	25.0	24	75.0	32	40.0
40-60	18	64.3	10	35.7	28	35.0
>60	17	85.0	3	15.0	20	25.0

Table 5. Distribution of Study Subjects According to HECSI Scores

Table-6 shows pattern of contact sensitivity. Potassium dichromate was the most common allergen with 20 (47.6%) patients sensitive to it, followed by Nickel sulphate with 16 (38.1%) patients positive to it. Fragrance mix sensitivity was found in 5 (11.9%), PPD in 4 (9.5%) patients, Wool alcohol in 3 (7.1%) and Balsum of Peru, Cobalt Chloride and Parthenium allergy was detected in 2 (4.8%) each, patients.

Type of antigen positivity	No. (n=54)	%
Nickel (Ni)	16	38.1
Fragrance mix (Frg)	5	11.9
Potassium dichromate (PD)	20	47.6
Paraphenylene-diamine (PPD)	4	9.5
Balsum of Peru (BP)	2	4.8
Cobalt chloride (CCL)	2	4.8
Wool alcohol (WA)	3	7.1
Parthenium (Par)	2	4.8

Table 6. Pattern of Contact Sensitivity (Patch Test Positivity)

Distribution of contact sensitivity in patients of hand eczema is depicted in Table-7. Patch test to one or more allergen was positive in 42 patients. Thirty four patients showed positivity to single antigen, five patients to two antigens each, two to three antigens each, and remaining one patient to four antigens.

Correlation between contact sensitivity and severity of hand eczema is shown in Table-8. It was found that patch test positivity was higher among those whose HECSI score was 40-60 (57.1%) than <40 and >60 (50%). There was no significant association between contact sensitivity and HECSI score.

Allergens	No. (n=42)	%
Ni, Frg, PPD	1	2.4
BP	1	2.4
Frg	3	7.1
Ni	12	28.6
Ni, BP	1	2.4
Ni, Frg, WA	1	2.4
Ni, PPD, CCL,WA	1	2.4
PD	17	40.5
PD, CCL	1	2.4
PD, Par	2	4.8

PPD	1	2.4
WA, PPD	1	2.4

Table 7. Distribution of Contact Sensitivity (Patch Test Positivity)

HECSI Score	No. of Patients	Patch Test				OR (95% CI)	p-value 1
		Positive		Negative			
		No.	%	No.	%		
<40	32	16	50.0	16	50.0	1.00 (0.32-3.05)	1.00
40-60	28	16	57.1	12	42.9	1.33 (0.42-4.22)	0.62
>60	20	10	50.0	10	50.0		

Table 8. Association Between Contact Sensitivity and Severity of Hand eczema (HECSI)

OR- Odds ratio, CI- Confidence interval, 1Binary logistic regression.

DISCUSSION

In our study, men outnumbered women with a ratio of 1.16:1. Somewhat similar, male to female ratio of 1.12:1, has been reported by Raghu MT et al., in their study on HE.[3] Most patients (56.2%), in our study, were in age group 21-40 years. This age incidence is lesser than (64%) reported by Kishore N et al.[9] and higher than (45.9%) reported by Bajaj AK et al.[10]

Occupations, which involve wet work and exposure to various chemical agents, like housewives, masons, industrial workers, farmers, labourers, are at higher risk for developing hand dermatitis.[3] We found 60 (75%) of our patients belonged to these high risk occupations. Twenty one (26.2%) of these were housewives, 17 (21.2%) masons, 10 (12.5%) industrial workers, 8 (10%) farmers and 4 (5%) labourers. Remaining 20 (25%) patients were from various other occupations.

There were 42.5% of our patients who gave history of exacerbation on contact with detergent and soaps, higher than 36.9%, 30% and 18%, reported by Minocha YC et al,[11] Huda MM et al[12] and Bajaj AK et al.,[10] respectively. Soaps and detergents have been implicated as predisposing factors in various studies. Their constituents such as potassium dichromate, fragrances, colophony may act as irritants or allergens.

Personal history of atopy was present in 38.8% of patients. Of these, 17.5% had Allergic rhinitis (AR), 12.5% Atopic dermatitis (AD) and remaining 8.8% had Bronchial asthma (BA). This is in agreement with 39% patients of atopy reported by Rystedt et al.,[13] in their study of HE, but at variance with 43% patients of atopy, in the series by Handa S et al.[6] However, no significant association was found between patch test positivity and atopic status of the patients in our study (p value=0.89). This is similar to the observation made by Handa S et al.[6]

Hyperkeratotic eczema was the commonest morphological type, accounting for 36.3% of cases, in our study. This is near similar to 32% cases of hyperkeratotic eczema, reported by Raghu MT et al,[3] but much higher than 9%, reported by Handa S et al.[6] The second most common type of eczema was housewives eczema, accounting for 26.3% cases. It is higher than 10% cases, reported by Handa S et al.[6] Pompholyx accounted for 12.5% cases, higher than 1%[3] and 8%,[9] reported in other studies.

Other morphological variants included fingertip eczema in 8.8%, higher than 4% cases of Raghu MT et al.[3] We found only 5 patients (6.2%) of patchy vesiculosquamous eczema that was less compared to 16% and 28%, reported by Raghu MT et al.[3] and Kishore NB et al., respectively.[9] This variation, in morphological pattern of HE, is probably due to different reaction pattern, in individuals, to different antigens and types of occupations.[3]

A total of 52.5% patients were positive for patch test in our study. Our finding is higher than 45.6% positivity reported by Hald M et al,[14] and lesser than 92.5% and 80%, reported by Huda MM et al.[12] and Sharma VK et al.[15] respectively. This variation in patch test positivity may be due to non-availability of the allergens, in the patch test of study subjects, and the quality of allergens included in the patch test.[3]

Potassium dichromate was the most common sensitizer in our study, with 47.6% positivity. This is at variance with positivity of 12.1%, 4.9% and 32% reported by Anger T et al,[16] Hald M et al,[14] and Kishore N et al,[9] respectively. The second most common allergen, in our study, was nickel sulphate with positivity in 16 (38.1%) patients. Nickel has also been reported to be common sensitizers in HE studies by Goh C et al[17] and Duarte I et al.[18]

Fragrance mix with 5 patients (11.9%), was the next common allergen implicated, in our study. Fragrances have been proved to be causing HE in previous studies by Heydorn S et al.[19] and Menne T et al.[20] Detergent, soap and cosmetics are the common causes of this sensitivity.[21] It accounted for fingertip eczema and pompholyx in 25% cases each, in patients with contact sensitivity, in our study.

Paraphenylenediamine allergy was found in 4 (9.5%) patients, higher than 4.8% reported by Anger T et al,[16] and 8.7% reported by Li LF et al.[21] It was incriminated in fingertip eczema and pompholyx in 25% cases each, in patients with contact sensitivity, in our study. Patch test was relevant in all these subjects as all these subjects were using hair dyes and henna to color their hair.

An association between contact sensitization and increase severity of HE has been reported previously.[16] However, no significant association between contact sensitivity and HECSI score was found in our study. Similar finding has also been reported by Handa S et al. in their study on HE.[6]

CONCLUSION

Contact sensitization is an important causative and or aggravating factor in the aetiopathogenesis of hand eczema. In our study 42 subjects (52.5%) were found to have contact sensitivity to various allergens. Potassium dichromate was the most common sensitizer, followed by

nickel, fragrance mix. Hyperkeratotic eczema was the most common type of HE (36.3%) followed by housewife eczema (26.3%), pompholyx (12.5%), fingertip eczema (8.8%), patchy vesiculosquamous and unspecified eczema (6.2%) each, recurrent focal palmar peeling (2.5%), and ring eczema (1.2%). There was no significant association between contact sensitivity, and atopy and severity of hand eczema, in our study. Identification of contact sensitizer is of immense help in the management of hand eczema patients.

REFERENCES

[1] Charan U, Peter C, Pulimood S. Impact of hand eczema severity on quality of life. Indian Dermatology Online J 2013;4(2):102.

[2] Lakshmi C, Srinivas CR. Hand eczema: an update. Indian Journal of Dermatology, Venereology, and Leprology 2012;78(5):569-582.

[3] Raghu MT, Karinagannanavar A, Parvathi CN. A study of clinical types of contact allergic dermatitis of hands and its association with allergens. International Journal of Applied Research 2015;1:643-650.

[4] Lerbaek A, Kyvik KO, Ravn H, et al. Clinical characteristics and consequences of hand eczema-an 8- year follow-up study of a population-based twin cohort. Contact Dermatitis 2008;58(4):210-216.

[5] Diepgen TL, Andersen KE, Brandao FM, et al. Hand eczema classification: a cross-sectional, multicentre study of the aetiology and morphology of hand eczema. Br J Dermatol 2009;160(2):353-358.

[6] Handa S, Kaur I, Gupta T, et al. Hand eczema: correlation of morphologic patterns, atopy, contact sensitization and disease severity. Indian Journal of Dermatology, Venereology and Leprology 2012;78(2):153-158.

[7] Held E, Skoet R, Johansen J, et al. The hand eczema severity Index (HECSI): a scoring system for clinical assessment of hand eczema. A study of inter-and intraobserver reliability. Br J Dermatol 2005;152(2):302-307.

[8] Spiewak R. Patch testing for contact allergy and allergic contact dermatitis. The Open Allergy Journal 2008;1(1):42-51.

[9] Kishore N, Belliappa A, Shetty N, et al. Hand eczema-clinical patterns and role of patch testing. Indian Journal of Dermatology Venereology Leprology 2005;71(3):207-208.

[10] Bajaj AK. Contact dermatitis of hands. Indian Journal of Dermatology Venereology Leprology 1983;49(5):195-199.

[11] Minocha YC, Dogra A, Sood VK. Contact sensitivity in palmar hyperkeratotic dermatitis. Indian Journal of Dermatology Venereology Leprology 1993;59(2):60-63.

[12] Huda MM, Paul UK. Patch testing in contact dermatitis of hands and feet. Indian Journal of Dermatology Venereology Leprology 1996;62(6):361-362.

[13] Rystedt I. Atopic background in patients with occupational hand eczema. Contact Dermatitis 1985;12(5):247-254.

[14] Hald M, Anger T, Blands J. Clinical severity and prognosis of hand eczema. Br J Dermatol 2009;160(6):1229-1236.

[15] Sharma VK, Kaur S. Contact dermatitis of hands in Chandigarh. Indian Journal of Dermatology Venereology Leprology 1987;53(2):103-107.

[16] Agner T, Andersen K, Brandao F, et al. Contact sensitisation in hand eczema patients-relation to sub diagnosis, severity and quality of life: a multicentre study. Contact Dermatitis 2009;61(5):291-296.

[17] Goh CL. An epidemiological comparison between occupational and non-occupational hand eczema. Br J Dermatol 1989;120(1):77-82.

[18] Duarte I, Terumi NJ, Lazzarini R. Hand eczema: evaluation of 250 patients. Am J Contact Dermatitis 1998;9(4):216-223.

[19] Heydorn S, Johansen JD, Klaus EA, et al. Fragrance allergy in patients with hand eczema-a clinical study. Contact dermatitis 2003;48(6):317-323.

[20] Heydorn S, Menne T, Johansen JD. Fragrance alllergy and hand eczema- a review. Contact dermatitis 2003;48(2):59-66.

[21] Li LF, Guo J, Wang J. Environmental contact factors in eczema and results of patch testing Chinese patients with a modified European standard series of allergens. Contact dermatitis 2004;51(1):22-25.