An Evaluation of Patch Test among Hand Eczema Patients Attending Tertiary Care Center in South East Rajasthan

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Abstract

Context: Hand eczema is one of the most common occupational dermatological condition. Chronicity and recurrence nature of hand eczema leads to loss of work and quality of life of workers. In order to identify the causative factor patch test could be relevant test.

Aims: To ascertain the etiology of hand eczema by performing patch test. To identify various morphological pattern and to know the various predisposing & exacerbating factors causing hand eczema.

Methods and Material: Hundred patients with suspected allergic contact dermatitis were patch tested with ISS. The allergens were obtained from Systopic Pharmaceuticals (P) Ltd., New Delhi. The standard patch testing technique using aluminium chambers was done and reactions were interpreted as recommended by ICDRG.

Statistical analysis used: The results were tabulated and analyzed. Student t-test/ chi square test will be applied at 5% level of significance to analyze the results of patch test by quantitative/ qualitative characteristics of the patients.

Results: Only 37 cases were positive to patch testing. Potassium bichromate was most common positive antigen in 16% cases, followed by Cobalt sulphate in 11% cases, nickel in 6% cases. Parthenium, Wool alcohol, Paraphenylenediamine, Colophony, Fragrance mix found positive in 3% cases each, Balsum of Peru in 2% cases. Formaldehyde, Thiuram mix, Mercaptobenzothiazole found positive in 1% cases each.

Conclusions: Patch test would be relevant test to identify the causative factors for Hand eczema especially those who have occupational risk factor. Patch test also helps in treatment and improvement of quality of life among workers.

Keywords: Hand Eczema Patch test Nickel Potassium Bichromate

Introduction

Hand eczema is a common and often, distressing skin condition due to its varied etiology, prolonged cause, remission and exacerbations, resistant nature to treatment and special anatomical features of the palmer skin. It was presumably first described in the 19th century.[1] It is a frequently encountered problem, affecting individuals of various occupations. An estimated 2% to 10% of population is likely to develop hand eczema at some point of time during life.[2] In addition, 20% to 35% of all dermatitis affects the hands. It appears to be the most common occupational skin disease, comprising 9% to 35% of all occupational disease and up to 80% or more of all occupational contact dermatitis.[3] Females are more commonly involved than males (2:1),[4] possibly because of increased exposure to wet work and household chemicals. The increasingly complex & industrialized environment of the 21st century, has made it all the more important to find the exact etiology of the disease & to use the appropriate preventive & treatment measures. Out of more than 6 million chemicals in the world's environment today, at least 2,800 have been reported to have contact sensitizing properties.[5] Knowledge of pattern of contact sensitivity in our patients of hand eczema may give insight of various etiological agents responsible for it, which can further help in management of these patients. The patch test is a biological test, becomes an important diagnostic tool for identification of the allergen/allergens responsible for the eczema. Patch test is both a screening test and a provocation test in the target organ skin. The benefits of patch testing in patients with suspicion of allergic contact dermatitis (ACD) include reduction of the treatment cost, and increased patients' quality of life. Various Indian studies have reported a wide range of patch test positivity in patients with hand eczema (46-82%).[6] The present study was undertaken to ascertain the epidemiology and its etiology as identify the exogenous agents causing hand eczema with the help of Indian standard series of patch testing, and to correlate the clinical pattern of hand eczema in relation to the allergens.

Materials and Methods

Total number of 100 cases diagnosed with hand eczema attending the Out Patient Department of Dermatology, Venereology and Leprology. Govt Medical College, Kota during study period of 1 year between October 2013 to September 2014. Ethical committee clearance was taken from the institute. The patients having hand eczema for at least 4 week duration aging more than 18 years and both sexes who give valid informed consent were included in the study. The patients who have received treatment with systemic corticosteroids within 4 weeks, Patients with concurrent fungal, bacterial infections, psoriasis, lichen planus and other dermatosis affecting hand, Patient who

had widespread eczema in other areas of body, Pregnancy, Lactating mothers, history of Any associated systemic disease, history of Excessive alcohol intake were excluded from study.

After taking informed consent detailed demographic profile, clinical evaluation of hand eczema and cutaneous examination done. A thorough account of the patient's occupation, its duration, work environment and material used thereof were noted. Routine test were done for evaluation of general health of every patient as haematological (Hb, TLC, DLC, TEC, ESR) and blood sugar (R). Patch testing conducted in every patient to ascertain the etiology of hand eczema.

The patch test kit comprises of micro porous tape (15 x 15cm) and aluminium patch test chamber. Aluminium patch test chambers with an internal diameter of 9 mm and a depth of 0.7 mm were used. The test chambers were placed facing up with 2cm distance from centre of each other. It is stored at room temperature. A single drop of the antigen taken from the Indian standard series (ISS) patch test kit (Systopic Laboratories, New Delhi) is placed in each of 20 Finn chambers. The Finn chambers are placed over 2 hypoallergenic micro pore adhesive tapes and applied on the back of the patient taking all necessary precautions. The test should be read 48 and 72 hours after the application. The patches will be removed and the reading should be taken 1 hour after the removal of patches.

All reactions will be graded according to the recommendation of the international Contact Dermatitis Research Group (ICDRG) [Table 1][7]. The diagnosis of allergic contract dermatitis will be confirmed based on a positive patch test to an allergen.

The results were tabulated and analysed. Descriptive statistics (percentage for qualitative variables and mean and standard deviation for quantitative characteristics) will be worked out to study the clinical characteristics of the subjects as well as those opting for patch testing. Student t-test/ chi square test will be applied at 5% level of significance to analyse the results of patch test by quantitative/ qualitative characteristics of the patients.

Results

Out of 100 patients, 69 were male and 31 patients were female. The age of the patients ranged from 18 to 60 years (Mean age = 37.65 ± 11.77 years & median age = 35 years). Most male (37.68%) were in 18-30 age groups & most female (35.48%) in 31-40 age groups. Seventy two were from urban background while 28 patients were from rural background. The patients were from different occupation. Maximum patients (39 patients) were Construction worker/ Labourer which was followed by housekeepers (22 patients). Most male (35/69 or 50.72%) were construction worker & most female (19/31 or 61.30%) were housekeepers. Other less common occupation was farmers (10), office worker (8), mechanic (7), carpenter, hairdresser, plumber, tailor (3), and students (2) [Table 2]. Duration of disease at the time of presentation varied from 1 month to 15 years and the mean disease duration was 3.28±3.31 years (median was 2 year). Most of the cases (60%) had involving both side (dorsal & palmer) of hand. Dorsum of hand was most common site of onset of hand eczema, seen in 86 patients in which 63 were male & 23 female. Patients in all occupations show predominantly dorsa of hand as the site of onset in hand eczema. All 100% cases of carpenter, mechanic, hairdresser, office worker, students, plumber & tailor shows onset from dorsa of hands. Various morphological patterns seen in our study, in which vesiculosquamous eczema was the commonest, accounting for 62% of cases [Fig. 1]. Most exacerbating factor was soap/detergents in 32% cases, in which 17 were male & 15 were female. Cosmetic was second common exacerbating factor found in 7 cases. Most cases of hand eczema (56%) were persistent during whole year. Thirty eight percent cases show occasional recurrence during their disease period. Only 37 cases were positive to patch testing. In which 27 were male & 10 were female. Male had 39.13% & female had 32.25% positivity to patch test [Table 3]. 26% cases were positive to single antigen & 11% cases were positive to more than one antigen [Fig. 2]. Potassium bichromate was most common positive antigen in 16% cases [Fig. 3], followed by Cobalt sulphate in 11% cases, nickel in 6% cases. Parthenium, Wool alcohol, Paraphenylenediamine, Colophony, Fragrance mix found positive in 3% cases each, Balsum of Peru in 2% cases. Formaldehyde, Thiuram mix, Mercaptobenzothiazole found positive in 1% cases each. In our study occupation wise positive patch test most commonly found in labourer/ construction worker group in 17/37 or 45.94% cases followed by house keepers in 8/37 or 21.62% cases. In our study patch test did not show significant association with any occupation ($p>0.05$). The maximum positivity of the patch test antigen was for Potassium bichromate (30.18%), and there was a 93.75% clinical relevance of this result. Cobalt sulphate (20.75%) was the second most common antigens with 90.75% clinical relevance. Nickel sulphate (11.32%) was next antigen with 90.32% clinical relevance.

Table 1: Shows ICDRG grading of patch test

Reaction	Grading	Interpretation
No Reaction	-	Negative
Doubtful	+/-	Not confirm
Erythema Only	+	Weak reaction
Erythema and papules	++	Moderately reaction
Papulovesicular lesions	+++	Strong reaction
Ulceration and oedema	++++	Irritant reaction

Table 2: Shows different occupation of study group

Occupation	Male (%)	Female (%)	Total
Farmers	4 (5.79)	6 (19.35)	10
Carpenter	3 (4.34)	0 (0)	3
Mechanic	7 (10.14)	0 (0)	7
Labourer/ Construction worker	35 (50.72)	4 (12.90)	39
House Keeping	3 (4.34)	19 (61.30)	22
Hairdresser	3 (4.34)	0 (0)	3
Office Worker	6 (8.68)	2 (6.45)	8
Student	2 (2.89)	0 (0)	2
Plumber	3 (4.34)	0 (0)	3
Tailor	3 (4.34)	0 (0)	3
Total	69 (100)	31 (100)	100

Table 3: Shows patch test positivity

Patch test positivity	Male	Female	Total
Non-reactive	42	21	63
Positive to single antigen	18	8	26
Positive to multiple antigen	9	2	11
Total	69	31	100

Fig. 1: Shows vesiculo squamous type of Hand eczema

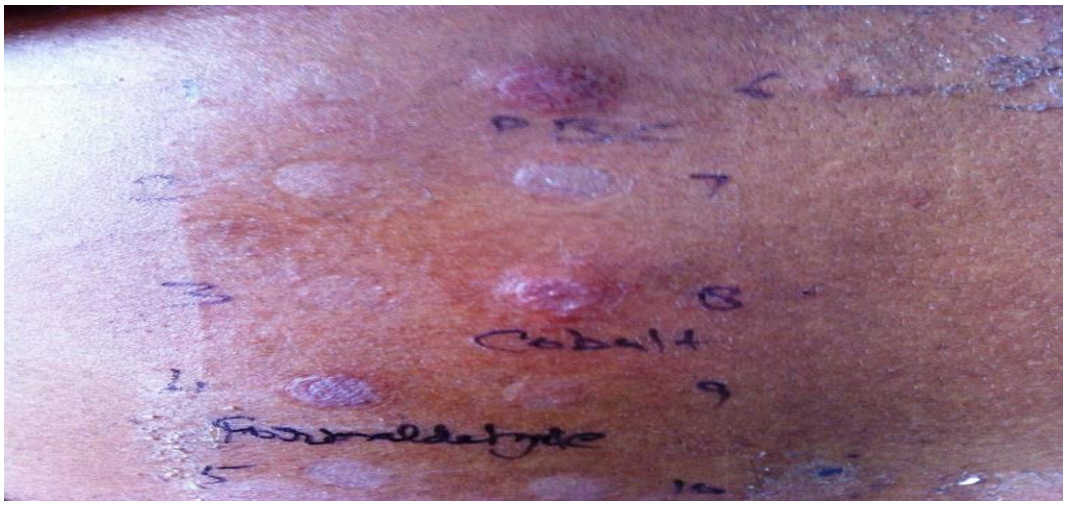

Fig. 2: Shows Positive patch test for cobalt sulphate (2+), PotassiumBiChromate (1+) & formaldehyde (1+)

Fig. 3: shows Patch test positivity for Potassium bichromate(2+)

Discussion

Hand eczema is a chronic, distressing, multi factorial condition with high incidence & prevalence. Hand eczemas affect both males and females. In the present study hand eczema was found to be most prevalent in 3rd & 4th decades of life. There was a male preponderance, with the M:F ratio being 2.2:1 which is not significantly different from study done by Laxmisha et al[8] ($P < 0.05$). In the present study the preponderance of hand eczema in younger age groups (between 20 to 40 years) was noted in 61% cases. This observation has also been found in studies by Bajaj AK[9], Goh CL[10] and Agrup[11] which show the prevalence of hand eczema, maximum in the 3rd & 4th decades. This correlates well with this being the most active period in any individual's life. Most cases (72%) in our study were from urban background. As people are moving to cities for their job requirements like labourers/ construction work, due to increasing industrialization, more incidences is found in urban areas. It also indicates that because of easy availability of medical facility & more awareness to health in urban area, people living in urban area report earlier than those in rural areas. Most common occupation group in our study was construction worker/ labourer (39%) followed by housekeepers (22%). Other less common occupations found were farmers, office workers, mechanic, carpenter, hairdresser, plumber, tailor, and students. Labourers and construction workers (39%) were the most predominant occupational group in our study, followed by housekeepers (22%). Most male patients (50.72%) were labourers/ construction workers. Among all female patients, housewives were the most frequently affected (61.30%).

Occupation has a significant bearing on hand eczemas because of exposure to various contact ants at workplace.[12,13] The work environment in certain high risk occupations such as cleaning, agriculture, and

construction is associated with a greater incidence of hand eczema.

Laxmisha et al[8] also found construction worker as most commonly affected occupational group. Housewives were found as most commonly affected group by Bajaj et al[14]. In the study by Suman et al[15], the most common occupation was household work (37%), followed by masonry (14%). In study by Kishore et al[16], the commonest occupational group among the females were the housewives (68.2%) whereas that among males comprised of skilled or semiskilled labourers (53.6%). Labourers had predominantly vesiculosquamous type of hand eczema (94.8%). Housekeepers had hyperkeratotic (63.3%) type of hand eczema. These observations are more or less similar to the studies done by Agrup[11] and Meding.[17] Dorsal surface has anatomically thin skin than palmer side, so sensitivity to irritant material is more on dorsal surface. Labourers mostly had involvement of dorsum of hands in 69.23% of cases. Housekeepers mostly involve dorsa of hands in 45.45% cases, both sides in 36.36% cases. This can be attributed to the fact that housewives do more wet work & hold vegetables in palms for peeling and slicing, exposing the fingers to the juice of these raw vegetables. All occupations show predominantly dorsa of hand as the site of onset in this study. Housekeepers shows onset from dorsa of hand in 72.7% cases & from palmer side in 27.2% cases. This result shows that dorsa of hand are more prone to insult from irritants due to thinness of skin over dorsal surface.[10] We found only 37% cases reactive to patch testing which was not significantly different from study done by Agarwal US et al[18] ($P < 0.05$). Patch test was mostly positive in labourers/construction workers in 45.94% cases followed by housekeepers in 21.62% cases. Potassium bichromate was most common positive antigen in 16% cases followed by Cobalt sulphate (11%) & Nickel sulphate (6%). Dichromate sensitivity was an expected result as many of the men in the study were from construction industry and cement used in construction remains the commonest source of chromate allergy, worldwide. Chromates are also present in cements, leather, matches, bleaches, yellow paints, varnishes, glue, soaps and detergents. Cobalt Sulphate (11%) was second most common antigen observed in our study. Study done by Sriniwas et al[19] shows allergy to cobalt was also frequent (7.1%). Sensitivity to cobalt may relate to jewellery or metal in clothing, dental plates, prostheses, plastic, vitamin B-12, pigments, printing inks, polyesters, lubricating oils, cement and detergents.

In our study Nickel sensitivity was observed in 6% cases. Nickel as an important causative factor in hand eczema has also been reported in earlier studies done by Bajaj et al[6], Peltonen L[20], Menne et al.[21] Nickel is present in objects as door knobs, bags, umbrellas, paper pins and clips etc. It can be leached out of stainless steel utensils by the action of sweat, soaps or detergents. In patients with clinically relevant positive patch test, on avoidance of that particular allergens or antigens (e.g. in case of construction workers and laborers i.e. bichromate) patient shows improvement in symptoms but on re-exposure, they had aggravation of the clinical features. Due to their poor economical condition they could not change their work/ occupation.

Around one fifth of the positive patch tests were not relevant i.e. the patient was not exposed to substances containing that antigen in day to day life. There was nothing remarkable in sensitivities to the other Indian Standard Battery allergens & they were observed more or less similar to those observed in earlier studies.

Conclusion

Hand eczema one of most distressing dermatological condition among workers. The Indian standard series of patch test proved to be very useful although, we encountered a less degree of patch test positivity in our patients but in positive antigens, clinical relevance was high. This result reflects that on avoidance of particular relevant allergens, patient can show improvement in symptoms. Efforts should be made to re-organize working conditions in those industries, employees of which are prone for hand eczemas, in order to reduce the prevalence and incidence of this disease.

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