

Original research article

## Clinical Profile of Allergic Contact Dermatitis and Evaluation of Contact Allergen by Patch Test

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### Abstract

**Introduction:** Allergic contact dermatitis (ACD) is a growing concern due to increased use of cosmetics and topical medications routinely and exposure to a large number of allergens on day-to-day basis. Patch testing is a reliable method for detecting the causative antigens in suspected cases. **Aims and Objectives:** To assess the pattern of ACD, and patch test profile of suspected cases of ACD attending of our department. **Materials and Methods:** It was a cross sectional study in which all the data enrolled in the clinically suspected contact dermatitis patients of our department from January 2021 to August 2021 period were analysed. Patch testing was done using the Indian Standard Series of 20 antigens primarily, and other batteries were used depending on patient requirement and availability. **Results:** A total of 66 patients were enrolled in the contact dermatitis clinic from January 2021 to August 2021. Hand eczema was the most common pattern seen in 10 cases followed by hand & foot eczema, feet eczema, wrist eczema, Hand & Neck etc. A total of 38 patients (57.6%) gave positive patch test results, with nickel sulfate being the most common allergen identified followed by potassium dichromate, cobalt sulfate, paraphenylenediamine, neomycin sulfate, and fragrance mix. **Conclusion:** Common allergens identified in our study were more or less similar to studies from other parts of India. However, due to the unique climate of the valley, the profile of parthenium sensitivity was low in our study when compared to the rest of the country.

**Keywords:** Patch Testing, Allergic Contact Dermatitis, Site of lesions, Single & Multiple Sensitisations.

### Introduction

Allergic contact dermatitis (ACD) is delayed type of hypersensitivity reaction in response to the exogenous agents. It occurs only in sensitised individuals, and population esteems vary from 1.7% to 6%. (1) Exposure to the allergen may be occupational or in the form of substances to which a person is exposed in day to day to day life. Individuals with ACD may have persistent or relapsing dermatitis which often affects the quality of life. ACD often remains undiagnosed, misdiagnosed or empirically diagnosed when the contributory allergens are not identified.

ACD affect social, occupational and psychological performance of an individual and adds to the morbidity. This makes the identification of the allergen important.

Globally the prevalence of allergic contact dermatitis (ACD) is increasing and the spectrum of its clinical patterns is expanding simultaneously. The genetic constitution of individuals and

presence of atopic eczema are believed to be important risk factors for development of ACD as there are more chances of contact allergy due to impaired epidermal barriers in topics. (2)

ACD is a delayed-type of hypersensitivity reaction in response to the exogenous agents. ACD is an antigen-specific reaction to an allergic irritating agent. (3) Nickel found in metal industry and household objects along with fragrances and preservatives are the most common allergens responsible for causing a significant number of cases of ACD globally. Allergens scubas chromates (present in cement, paint and coolants) and paraphenylenediamine (PPD) (in hair dyes) follow subsequently, but are more incriminated in occupational setting. (4)

Patch test has been established as a useful tool for the diagnosis of ACD and exact identification of contact allergens. Knowledge about the responsible allergen for ACD helps a long way in reducing morbidity in such cases by identifying the incriminating allergen and can thus help minimise the impact of ACD in the affected individuals. The main purpose of the study is to identify the common allergens and observe the clinical profile of the ACD. By identifying the exact cause, we can advice to avoid the allergens and thus reduce morbidity and cost to patient.

### **Material & Methods:**

This was Cross sectional observation descriptive study conducted in the department of Dermatology, Venereology & Leprology, at a government medical college and Hospital Aurangabad from January 2021 to August 2021. All patients of clinically suspected to have allergic contact dermatitis age more than 18 years and willing to be participate and to sign informed consent were included in this study. Exclusion criteria were those patients who were not willing to participate. Pregnant women were excluded. Patients with acute exacerbation of their skin lesions were given treatment before testing.

Patients were enrolled by using simple random sampling technique & total 66 patients were enrolled for the study. Sample size calculated by using incidence of ACD in patch test result, with 90% of confidence interval, 57% positive patch results of ACD with considered 10% of margin of error. A detailed clinical history and physical examination was undertaken for all patients like; Age, sex, chief complaints, symptoms, past history, associated medical disorder, cosmetics and personal hygiene products used, concomitant treatment (topical & systemic) , cutaneous examination which include distribution and type of lesion. Data will be collected from patients themselves while interrogation during assessment and patient record file. Patches was applied to the upper back using aluminium patch test chambers mounted on a micropore tape. Patches was removed after 2 days, and readings will be taken on 48 h and 96 h for all patients. The result was interpreted according to the International Contact Dermatitis Research Group (ICDRG) criteria.

### **Statistical Analysis:**

The recorded data was complied & entered in a Microsoft excel 2013 and then exported to data of Statistical packages of social science (SPSS) version 20.0 (SPSS. Inc. Chicago, Illinois, USA). Qualitative data will be recorded and collected as frequency and percentage of comparison between different type of allergens. Association test will be applicable for socio demographic variable and also history of patients. For all tests, confidence level were considered 95% & p value less than 0.05 were considered as a statistically significant.

**Results:**

A total clinically suspected to have allergic contact dermatitis 66 patients were enrolled during study period, 38 (57.6%) showed one or more positive reactions. Of these 22 (57.9%) were female and 16 (42.1%) were male. The frequencies of sensitisation between the age groups, majority of 17 patients were belonged to the 18 - 35 years, of these 12 were female & 5 were male. In both male and female, the frequency of sensitisation was less in the old age group, 7.9% and 10.5% respectively. (Table No 1)

**Table No. 1: Age group wise frequency distribution in Allergic Contact Dermatitis patients (n = 38)**

Age Groups	Male	Female	Total
18 - 35 years	5 (13.2%)	12 (31.6%)	17 (44.7%)
36 - 50 years	8 (21.1%)	6 (15.8%)	14 (36.8%)
> 50 years	3 (7.9%)	4 (10.5%)	7 (18.4%)
Total	16 (42.1%)	22 (57.9%)	38 (100.0%)

The distribution of the sites of skin lesions at the time of presentation appear in Table no. 2. One fourth of the patients (26.3%) presented with hand dermatitis. This was followed, in decreasing frequency, by generalized skin lesions, hand and neck dermatitis, head and feet involvement, including the face, feet dermatitis, wrist lesions, and perioral dermatitis.

The distribution of subjects with one or several sensitisations is shown in Table 3. There was a greater tendency for women to show a single sensitisation (23.0%) than a sensitisation to two (15.1%) or more than two allergens (14.5%). In men the distribution was almost uniform.

**Table No. 2: Distribution of skin lesions in Allergic Contact Dermatitis patients (n = 38)**

Site of Lesion	Number of Patients	Percentage
Hands	10	26.3%
Hands and Feet	6	15.8%
Feet	4	10.5%
Wrist	3	7.9%
Hand and Neck	5	13.2%
Generalised	9	23.7%
Perioral	1	2.6%

**Table No. 3: Distribution of Single and Multiple Sensitisations in allergic contact dermatitis patients (n = 38)**

No. Of Positive Reactions	Male	Female
1	6 (15.8%)	9 (23.7%)
2	5 (13.2%)	7 (18.4%)
> 2	5 (13.2%)	6 (15.8%)
Total	16 (42.1%)	22 (57.9%)

Of the 129 positive reactions elicited from antigens, nickel sulfate turned out to be the most common allergen identified in 11 cases followed by potassium dichromate & Cobalt sulphate in 10 cases, PPD in 9 cases, neomycin sulfate in 9 cases, and fragrance mix in 9 cases. Other allergens seen were mercaptobenzothiazole (8 cases), parthenium (7 cases), thiuram mix (7 cases), formaldehyde (6 cases), colophony (5 cases), peru balsam (5 cases), paraben mix (4 cases), nitrofurazone (4 cases), black rubber mix (4 cases), wool alcohol (3 cases), 4-tert-butylphenolformaldehyde resin (3 cases), epoxy resins (2 cases), benzocaine (2 cases), mercapto mix (1 case), and polyethylene glycol (1 case).

**Table No. 4: Profile of patch test positivity in the allergic contact dermatitis patients.**

Name of Antigen	No. Of Patients with positive reactions
Nickel Sulphate	11 (28.9%)
Potassium bichromate	10 (26.3%)
Cobalt sulphate	10 (26.3%)
Paraphenylenediamine	9 (23.7%)
Neomycin sulphate	9 (23.7%)
Fragrance mix	9 (23.7%)
Mercaptobenzothiazole	8 (21.1%)
Parthenium	7 (18.4%)
Thiuram mix	7 (18.4%)
Formaldehyde	6 (15.8%)
Colophony (colophonium)	5 (13.2%)
Perubalsam (myroxylon Pereira resin)	5 (13.2%)
Paraben mix	4 (10.5%)
Nitrofurazone	4 (10.5%)
Black rubber mix	4 (10.5%)

Wool alcohol (Lanolin)	3 (7.9%)
4 - Tert - Butylphenolformaldehyde resin	3 (7.9%)
Epoxy resins	2 (5.3%)
Benzocaine	2 (5.3%)
Disperse blue	2 (5.3%)
Polythylene glycol	1 (2.6%)
Mercapto mix	1 (2.6%)
Disperse Orange	1 (2.6%)
Jasmine absolute	1 (2.6%)
Rose oil	1 (2.6%)
Musk mix	1 (2.6%)
Triclosan	1 (2.6%)
Cetrimide	1 (2.6%)
Sorbic acid	1 (2.6%)
Total	129

### Discussion:

Clinical manifestations of ACD are highly varied, depending on the degree and frequency of contact with the allergen, the nature of the putative allergen, and host-related factors. The clinical presentation varies from patient to patient, often posing a diagnostic challenge to the treating dermatologist.

In our study, the most common allergen identified was nickel sulfate which accounted for 11 (28.9%) of the 129 positive patch test reactions seen in our study group followed by potassium dichromate accounting for 10 (26.3%) positive patch test reactions. Both these allergens have also been identified as the most common allergens in other studies done from Kashmir valley.(5,6) Nickel is present ubiquitously in the environment and was the most common allergen identified in females in our study. The reason for early development of nickel sensitivity in our population can be attributed to the common use of nickel-plated accessories and jewellery especially in females.

Potassium dichromate was the second most common allergen identified in our study. It was the most common allergen identified in males in our study population. Most of the patients giving positive patch test reactions to potassium dichromate were construction workers, while the rest were involved in other occupations but would occasionally do the small construction works at their houses or shops to save money. Other possible sources of exposure to chromates included use of paints, woods, glass, and cleaning products. Potassium dichromate has also been identified as a common allergen in other studies.(7 - 10)

Cobalt sulfate was the third most common allergen identified in our study population. It constituted for 10 (26.3%) positive patch test reactions. Cobalt is an invariable contaminant of nickel and is also found in cement.(11,12)

Other important sensitizers in our study population included PPD, neomycin sulfate and fragrance mix which constituted for 9 (23.7%) respectively positive patch test results, respectively. Neomycin is available freely as an over-the-counter topical medication in the local markets of valley (especially in combination with other drugs). Neomycin and gentamicin have already been reported as an important allergen in many other studies.(1, 6, 13, 14) Another important allergen identified in our study was fragrance mix similar to some other studies from North India.(6,10) The increased use of cosmetics, toiletries, and skin care products was thought to be responsible for more number of positive reactions to fragrance mix in our study.

Parthenium, being an important allergen in whole of India,(1,10) was only rarely encountered in our study. The reason for the lesser positivity to parthenium seen in our study and reported previously(5) However, it was not possible for us to do patch testing with plant series in patients attending our contact dermatitis clinic on a routine basis due to nonavailability of these batteries which forms an important limitation of our study. Also, “as is” testing for certain cosmetics and food items was not done in our study.

### **Conclusion:**

Such cross sectional studies are important to know the cumulative data from a particular geographical area as there can be variation in the allergen distribution which can affect the patch test profile. Common allergens identified in our study such as nickel sulfate, potassium dichromate, cobalt sulfate, and PPD are more or less similar to studies from other parts of India. However, due to the unique climate of the valley, the profile of parthenium sensitivity was low in our study when compared to the rest of the country.

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**Conflict of Interest :** Nil

**Ethical Approval :**Approved by Institutional Ethical Committee

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