

Clinicoepidemiological and Patch Test Profile of Contact Dermatitis patients in a Tertiary Care Hospital in Rajasthan

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Abstract

Background: Allergic contact dermatitis is a common dermatological disorder causing significant physical and psychosocial morbidity owing to its protracted course and frequent exacerbations. Patch test can be a valuable tool in diagnosing ACD by identifying the culprit allergen.

Aims: to assess the demographic profile, pattern of ACD, confirm the common causative allergen in suspected cases of ACD using patch test.

Methods: Records of 60 consecutive patients with ACD and patch tested in outpatient clinic between April 2021 to May 2022 were analyzed for this retrospective hospital based observational study. Clinical patterns of ACD were determined and patch testing was done using Indian standard series.

Results :Most common morphological pattern observed was Airborne contact dermatitis (21.6%; 13/60) followed by Hand Eczema (16.67%;10/60) Patch test positivity to one or more allergen was seen in 56.67% (34/60) patients Most common allergen was parthenium (23.3%) followed by fragrance mix (13.3%), chromate (11.6%) and paraphenylenediamine (PPD) (11.6%). Positivity to multiple allergens was seen in 13.3% (8 /60) patients.

Majority of the patients involved in agricultural work had parthenium positivity (7 patients) Homemakers which constitute the majority of our patients had positivity predominantly to nickel(3), parthenium (2), PPD (2) and chromate (2)

Conclusion: Parthenium was found to be the major allergen across all the occupations particularly agriculture related .Amongst homemakers, nickel and PPD are chief allergens responsible for ACD; PPD commonly manifests as acrofacial /facial dermatitis while most common presentation with nickel is that of hand eczema. Such retrospective studies helps in establishing the pattern of prevalent allergens in a demographic area which aid both physician and patients alike in prevention and management of ACD.

Keywords: ICD, ACD, PPD

Introduction

Contact dermatitis occurs when the skin comes in contact with external agents. It may be either be Irritant contact dermatitis (ICD), which accounts for ~80% of all contact dermatitis or allergic contact dermatitis (ACD) which accounts for the remainder.^{1,2}

ACD, apart from physical morbidity, also causes significant psychosocial distress owing to its protracted

course and frequent exacerbations. Therefore, diagnosing ACD by identifying the culprit allergen and avoiding it at earliest is of paramount importance to reduce the associated morbidity and improve the quality of life.

Diagnosis depends on several factors such as demographic profile of patients, local industrial development, index of suspicion of physician, and availability of patch testing.

Patch testing remains the gold standard in diagnosis of ACD and should be performed in all patients in whom contact allergy is suspected or needs to be excluded.¹

This study was undertaken to assess the demographic profile, pattern of ACD, confirm the common causative allergen in suspected cases of ACD using patch test.

Materials and methods

Records of 60 consecutive patients with ACD and patch tested in outpatient clinic of a department of Dermatology, venereology and leprosy department at JNU Hospital, Jaipur, Rajasthan between April 2021 to May 2022 were analyzed for this retrospective hospital based observational study. The study was approved by Institutional Ethics Committee.

The demographic profile, occupations, clinical patterns and duration of dermatitis, and detailed medical history were recorded. History, regarding habits, hobbies, correlation with the usage of particular items such as medicaments, cosmetics soap, jewelry, etc. was asked.

The various patterns of ACD observed were categorized into various groups like hand dermatitis, feet dermatitis, Acral dermatitis (involvement of both hands and feet), facial dermatitis, photoallergic contact eczema (involving primarily the photoexposed areas such as face, V area of neck, and dorsal aspects of both hands and forearms with well-demarcated margins where the skin is covered with clothing) air-borne contact dermatitis (ABCD) (affecting primarily the exposed areas of face, V

area of neck, hands, and forearms, Wilkinson's triangle, both eyelids, nasolabial folds).

Patients who had variable presentation which did not fit in any specific patterns were classified under non-specific eczema.

All the patients (irrespective of age) were included in the study. However, patients on oral corticosteroids and other immunosuppressants, pregnant, and lactating females were excluded.

The Indian standard patch test series comprising 20 allergens approved by Contact and Occupational Dermatoses Forum of India and marketed by Systopic India Ltd, New Delhi (India), was used for patch testing.

The patch testing was performed using Finn chamber® method according to European Society of Contact Dermatitis guidelines.³ Allergen strips were applied to the patient's upper back in vertical rows under occlusion and kept for 2 days (48 hrs) (Figure 1). The patients were advised to avoid wetting of the application site. After 48 hours, the finn chambers were removed. Reading and pictures were taken after half an hour. A second reading was taken after 72 hours to confirm the presence of allergic reaction.

Patch test results were graded according to the International Contact Dermatitis Research Group (ICDRG) criteria.⁴

Relevance (present, past, probable or unknown) was determined after the patch test result on the basis of whether the dermatitis was chronologically and clinically congruent with the following: exposure (present relevance), past exposure (past relevance), exposure at any time probable (probable relevance), or indeterminate exposure (unknown relevance).

All patients were informed about the cause of their dermatitis and provided with standard treatment and counseling for avoidance of implicated allergen(s).

Statistical analysis was done using statistical package for social sciences (SPSS) version 24. Microsoft word and Excel have been used to generate graphs, tables etc.

Results

Majority of the persons were homemakers 28.3 % (17/60) followed by farmers (15%; 9/60), office workers and business/shop owners. Besides this, 2 males and 3 females were additionally occasionally involved in farming and gardening activities.

Majority of the patients presented with hyperpigmented scaly plaques (33.33%). Most common morphological pattern observed was Airborne contact dermatitis (21.6%; 13/60) followed by Hand Eczema (16.67%; 10/60) and facial eczema (15%; 9/60). Majority of the patients had history of exposure to parthenium (45%; 27/60) followed by dye (31.6%; 19/60) and cosmetic agents. History of atopy was present in 11.67% (7/60) individuals. Clinicoepidemiological characteristics of the patients are summarized in Table 1.

Majority of the patients (91.67%; 55/60) had taken some form of treatment in past while 51.6% (31/60) had taken oral medications in form of steroids or immunosuppressive.

Patch test positivity to one or more allergen was seen in 56.67% (34/60) patients. Out of which 34 were males and 26 were females. Most common allergen was parthenium (23.3%) followed by fragrance mix (13.3%), chromate (11.6%) and paraphenylenediamine (PPD)(11.6%).

Positivity to multiple allergens was seen in 13.3% (8 /60) patients. Grade 2 (Figure 2) positivity was seen predominantly in 18 pts followed by grade 1(17 patients)(Figure 2) and grade 3 (12 patients)(Figure 3). Patch test positivity along with ICDRG grading has been summarized in Table 2.

Majority of the patients involved in agricultural work had parthenium positivity (7 /12) and All the patients who

were labourers by occupation with positive patch test had positivity to chromate (4/4). Homemakers which constitute the majority of our patients had positivity predominantly to nickel (3), parthenium(2), PPD(2) and chromate(2).(Table 3)

Relevance (past / present/probable) had been established in all cases of nickel and chromate positivity and in majority of patients in cases of parthenium(12 patients) and PPD (6 patients) positivity. Relevance of patch test has been tabulated in Table 4

None of the patients had reactivity to wood alcohol, perubalsam, formaldehyde, mercaptobenzothiazole, colophony, epoxy resin, thiuram mix, black rubber mix, and nitrofurozone.

Discussion

A slight male preponderance was observed in our study which may be due to greater exposure to occupational allergens in males and lesser access to health care services amongst females particularly in rural areas. This male predominance was in concordance with other studies^{2,5}.

Majority of our patients belonged to age group 41 to 60 years and 21-40 yrs which is the age group corresponding to maximum exposure to occupational contact allergens.^{2,6,7}

Similar to various other studies,⁸⁻¹⁰ Majority of the patients were homemakers(28.33%;17/60) . Possible reasons for this predominance may be exposure to various domestic allergens, use of soap, cleaning agents and wet work. Farming was found to be the most common occupation amongst male patients similar to the study by Mahajan et al⁶

Patch test positivity reported in various Indian studies range from 30% to 76%.^{2,6,11-14} Patch test positivity in our study was seen in 56.67% of the patients, similar to many other indian studies^{2,13,14}

Parthenium hysterophorus is the commonest reported contact allergen eliciting positive reactions in 23% to 70% cases in India.^{2,6,15,16} In our study it was reported to be 41.17% (13/34) and was most commonly associated with agricultural activities. Besides farming, positivity was also seen in homemakers, shopkeepers and other occupations. Although most common presentation associated with parthenium positivity was Airborne contact dermatitis, other patterns such as non-specific, photoallergic hand and facial dermatitis were also observed. This observation reiterates the significance of patch tests in diagnosis of Allergic contact dermatitis, especially in cases where clinical morphology and history is not sufficient to arrive at a diagnosis. Most of the patients in our study had present relevance to parthenium (7/13).

A higher percentage of positivity to fragrance mix was noted (8 patients). This may be attributed to increasing trend of cosmetics usage. Mehta et al² reported a higher incidence of fragrance positivity and attributed it to either of these causes:

- prior sensitization to perfumes
- Increased sensitivity to perfumes present in soaps/detergents due to cumulative insult in housewives eczema
- positivity not relevant to dermatitis.

In our study most of the positive reactions had unknown relevance hence were not probably related to dermatitis. Potassium dichromate and PPD positivity were seen in 7 patients each. Majority of the patients with dichromate positivity were labourers. Many previous studies have also reported higher rates of positivity of potassium dichromate.^{2,11,14,17} This may be attributed to the usage of leather footwear and contact with cement in case of males and usage of variety of footwear in females.

PPD, the culprit antigen behind hair dye dermatitis was found to be positive in 7 patients out of which 6 patients had current relevance and all patients had previous history hair dye usage. Similar rates of positivity have been reported by other studies.^{6,12} Majority of the patients presented with facial and acrofacial dermatitis.

Nickel positivity in various studies has been reported in range of 10 to 23 %^{2,10-12,14} In our study, it was noted to be positive in 4 cases similar to another study by Bajaj et al.¹⁴ All positive Patients had history of usage of artificial jewellery, metal watches, belts etc and clinical relevance was established in all patients.

In contrast to other studies^{2,10-12,14} which have reported nickel and PPD as the most common culprits of ACD in homemakers, our study revealed a mixed pattern with nearly equal contribution of nickel, chromate, PPD and parthenium.

Positivity to multiple allergens was seen in 13.3% (8/60) patients is apparently from concurrent exposure to various allergens eliciting multiple positive patch test reactions or is perhaps from non-specific hyperreactivity as cross reactions between them are not documented.

Limitations

The limitations of our study are relatively smaller sample size and allergens other than Indian Standard series were not included.

Conclusion

Avoidance of allergen is the cornerstone of management in any allergic disorder and patch test helps to pinpoint the same especially in cases which atypical presentation or cases not responding to treatment.

Parthenium was found to be the major allergen across all the occupations particularly agriculture related which besides its classical presentation, can also present as isolated acral, facial or non-specific dermatitis. Amongst homemakers, nickel and PPD are chief allergens

responsible for ACD; PPD commonly manifests as acrofacial /facial dermatitis while most common presentation with nickel is that of hand eczema.

Such retrospective studies helps in establishing the pattern of prevalent allergens in a demographic area which aid both physician and patients alike in prevention and management of ACD.

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Legend Tables and Figures

Table 1: Demographic profile of patients

Characteristic		No of patients n (%)
Gender	Males	34
	Females	26
Age (years)	<21	3
	21-40	17
	41-60	26
	61-80	14
Duration (yrs)	<1	19
	1-5	21
	>5-9	12
	>9	7
Occupation	Agriculture	9
	Homemaker	17
	labourer	5
	Office workers	8
	Others	8
	Shop/factory	8
	Student	5
Clinical patterns	Airborne contact dermatitis	13
	Acral	4
	Acrofacial	6
	Hand dermatitis	9
	Feet dermatitis	6
	Photoallergic dermatitis	4
Patch test	Unclassified	1
	Positive	34
	Negative	25
	Excited skin syndrome	1

Table 2: Patch test positivity with ICDRG grading

Antigen	Grading			Total
	Grade 1	Grade 2	Grade 3	
Perubalsam	2	0	0	2

Potassium bichromate	3	3	1	7
Nickel	0	2	3	5
Cobalt	1	0	0	1
Parthenium	5	4	5	14
PPD	2	3	2	7
Neomycin	0	1	1	2
Benzocaine	1	0	0	1
Fragrance Mix	3	5	0	8
Total	17	18	12	47

Table 3: Patch test positivity with respect to occupation of the patients

Antigen	Occupation						
	Agriculture	Home maker	Labourer	Office workers	Others	Shop/factory	Total
Perubalsam	0	1	0	1	0	0	2
Potassium bichromate	1	2	4	0	0	0	7
Nickel	0	3	0	0	2	0	5
Cobalt	0	1	0	0	0	0	1
Parthenium	7	2	0	0	2	3	14
PPD	0	2	0	3	0	2	7
Neomycin	0	1	0	1	0	0	2
Benzocaine	0	1	0	0	0	0	1
Fragrance Mix	4	1	0	0	1	2	8
Total	12	14	4	5	5	7	47

Table 4: Relevance of patch test positivity

Patch test positivity	Relevance				
	Probable	Present	Past	Unknown	Grand Total
Perubalsam	0	0	0	2	2
Potassium bichromate	3	3	1	0	7
Nickel	2	1	2	0	5
Cobalt	0	0	0	1	1
PPD	0	5	1	1	7
Parthenium	3	7	2	2	14
Neomycin	0	0	0	2	2
Benzocaine	0	0	0	1	1
Fragrance mix	1	2	0	5	8



Figure 1: Placement of strips Finn's chamber loaded with antigen on upper back of patient



Figure 3: Grade 3 positivity to parthenium

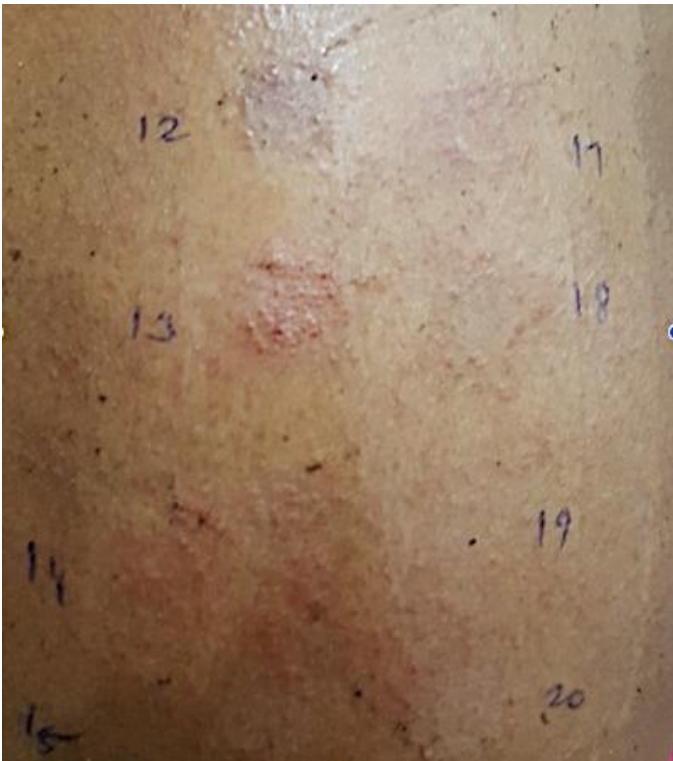


Figure 2: Grade 2 positivity to Parthenium and grade 1 positivity to PPD