

A study on identify the common allergens causing contact dermatitis article

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Abstract

Introduction

Contact dermatitis is an inflammatory eczematous skin disease. It is caused by chemicals or metal ions that exert toxic effects without inducing a T-cell response (contact irritants) or by small reactive chemicals that modify proteins and induce innate and adaptive immune responses (contact allergens).

Material and Methods

A total of 100 patients of contact dermatitis of either sex who attended the Out-Patient Department of Dermatology, Venereology and Leprosy at Tertiary care teaching hospital over a period constituted the subject material for the present study. Inclusion Criteria: Patients clinically suspected to have contact dermatitis. Patients with active dermatitis were first treated and then subjected to patch testing so as to avoid false positivity and excited skin syndrome (Angry back syndrome).

Result: In our study males (51%) outnumbered females (49%) in the study. Itching was the most common symptom (98%) followed by burning and oozing (10%). In this study, most commonly observed period was 1-5 years, as seen in 57% of the cases. Study sensitization to one antigen was seen in 40% cases, to two antigens in 27% cases, three antigens in 2% cases. Negative results observed in 31 % cases. Positive patch test results were noted commonly among the following occupations were labour (85.71%), farmer (66.66%), housewife (62.96%), mason (53.33%) cases respectively. Cosmetic allergens ($P < 0.0001$) significantly more common in females. Parthenium ($P < 0.05$) significantly more common in males.

Conclusion

In our study, the commonest allergens in our patients from hospital adjoining places were potassium bichromate, thiuram mix and parthenium in males, whereas nickel, fragrance mix and kumkum in females. In view of the differences in clinical patterns, positivity rates etc. reported from different parts of India, we owe it to our patients to clarify the epidemiology of this important problem.

Key words: Allergens, Dermatitis, Irritant contact dermatitis, allergic contact dermatitis.

Introduction

Contact dermatitis is an inflammatory eczematous skin disease. It is caused by chemicals or metal ions that exert toxic effects without inducing a T-cell response (contact irritants) or by small reactive chemicals that modify proteins and induce innate and adaptive immune responses (contact allergens). [1]

Contact dermatitis is divided into irritant contact dermatitis and allergic contact dermatitis. Irritant contact dermatitis is a nonspecific response of the skin to direct chemical damage that releases mediators of inflammation predominantly from epidermal cells while allergic contact dermatitis is a delayed (type 4) hypersensitivity reaction to exogenous contact antigens. [2] Immunological responses are due to the interaction of cytokines and T cells. In photo contact, allergic dermatitis lesions are confined to sun-exposed areas even though the allergen is in contact with covered areas. [3]

It is due to sufficient inflammation arising from the release of proinflammatory cytokines from keratinocytes, usually in response to chemical stimuli. It mainly causes skin barrier disruption, epidermal cellular changes, and cytokine release. [4] Irritants can be classified as cumulatively toxic (e.g., hand soap causing irritant dermatitis in a hospital employee), subtoxic, degenerative, or toxic (e.g., hydrofluoric acid exposure at a chemical plant). [5]

Allergic contact dermatitis is T-cell mediated inflammation of the skin caused by repeated skin exposure to haptens in a sensitized individual. Allergic contact dermatitis has two phases. [6] The sensitization phase in which antigen-specific effector T cells are induced in the draining lymph nodes by antigen captured cutaneous dendritic cells that migrate from the skin. The elicitation phase includes effector T cells that are activated in the skin by antigen captured cutaneous dendritic cells and produce various chemical mediators, which create antigen-specific inflammation. [7]

Photo contact dermatitis occurs when an allergen becomes an irritant in the presence of light. Contact urticaria usually presents with a 'wheal and flare' reaction after exposure to the offending topical agent. While most cases are mild, anaphylactic reactions can occur. [8] Some common types of contact urticaria include exposure to cold, dermatographism, pressure, exercise, solar, heat and cholinergic. Contact dermatitis can also occur after exposure to plants of the Urticaceae family. [9]

Material and Methods

A total of 100 patients of contact dermatitis of either sex who attended the Out-Patient Department of Dermatology, Venereology and Leprosy at Tertiary care teaching hospital over a period constituted the subject material for the present study.

Inclusion Criteria:

- Patients clinically suspected to have contact dermatitis.
- Patients who are willing for patch testing

- Patients with active dermatitis were first treated and then subjected to patch testing so as to avoid false positivity and excited skin syndrome (Angry back syndrome).

Exclusion Criteria:

- Patients having pre-existing skin disorders.
- Patients who refuse patch testing.
- Patients on immune suppressive therapy
- Pregnancy

HISTORY AND EXAMINATION:

A detailed history of each patient was recorded in the proforma specially designed for the study including the particulars about present complaints and durations, seasonal variation, medicaments used for pre-existing lesions.

Childhood eczema and atopy in self or family members. A detailed occupational history including the agents used in the work environment, and their association with ACD, were recorded. Comprehensive account of various items used routinely such as chemicals, detergents, medicaments, lubricants, cleansers, vegetables, gloves, finger rings etc., was recorded and its relevance to the clinical presentation was assessed. Hobbies and part-time jobs like photography, gardening, automotive repairs, cooking, sewing, construction or masonry, painting and wood work were recorded in the proforma.

A complete clinical examination was carried out in all patients and details about the nature, extent and morphology of lesions were carefully noted down. Further, their relevance was assessed and evaluated for the probable contactants in the individual patient. The routine haematological and urinary investigations were done. These patients were later subjected to patch testing, after obtaining their consent.

RESULTS

TABLE-1: SEX DISTRIBUTION

Sex distribution	No. of Patients N=100	Percentage
Male	59	59
Female	49	49

Males (51%) out numbered females (49%) in the study.

Table - 2: Complaints

Complaints	No. of Patients N=100	Percentage
Itching	98	98.0
Burning	24	24.0
Oozing	10	10.0

Itching was the most common symptom (98%) followed by burning and oozing (10%).

Table - 3: Duration

Duration of illness	No. of Patients N=100	Percentage
< 6 months	18	18.00
6-12 months	23	23.00
1 - 5 years	57	57.00
> 5 yrs	2	2.00

In this study most commonly observed period was 1-5 years, as seen in 57% of the cases

Table - 4: Distribution of contact dermatitis cases according to single and multiple sensitization

Sensitization	No. of Patients N=100	Percentage
Single antigen	40	40.0
two antigen	27	27.0
Three antigen	2	2.0
negative	31	31.0

Study sensitization to one antigen was seen in 40% cases, to two antigens in 27% cases, three antigens in 2% cases. Negative results observed in 31 % cases.

Table - 5: Correlation of positive patch test results with occupation.

Occupation	N = 100	Patch test Positive N=69	Percentage
Farmer	12	8	66.66
Housewife	27	17	62.96
Labour	7	6	85.71
Mason	15	8	53.33
Mechanic	6	3	50
Nurse	4	4	100
Student	10	8	80
Teacher	8	6	75
Beautician	3	3	100
Barbar	2	2	100
Electrician	2	2	100
Factory worker	2	0	-
Medical worker	1	1	100
Priest	1	1	100

Positive patch test results was noted commonly among the following occupations were labour (85.71%), farmer (66.66%), housewife (62.96%), mason (53.33%) cases respectively

Table - 6: Comparison of antigen sensitization in males and females

Sensitization	No. of Patients N=100		Statistical analysis X^2 test
	Male N=51	Female N=49	
Positive	33	36	0.91, NS
Negative	18	13	

NS - Not significant, $P < 0.05$ - statistically significant

There was no statistically significant difference in the sensitization rates in males and females.

Table-7: Comparison of various categories of allergens in males and females

Allergens	Male N=33	Female N=36	Statistical analysis χ^2 test, df=1
Cosmetic Allergens	6	28	29.29, $P < 0.0001$
Plant allergens	9	3	4.13, $P < 0.05$
Drug allergens	1	5	2.56, NS
Metal allergens	16	12	4.07, $P < 0.05$
Rubber allergens	13	5	4.68, $P < 0.05$
Plastic material allergens	2	0	2.25, NS
Total	47	53	

NS - Not significant, $P < 0.05$ - statistically significant

Table – 8: Comparison of allergens commonly present in cosmetics in males and females

Cosmetic Allergens	Male N=33	Female N=36	Statistical analysis X test, df=1
Perubalsam	1	2	

Formaldehyde	0	2	
Colophony	0	3	
Parabens mix	0	3	
araphenylenediamine	3	3	
Fragrance Mix	1	6	
Kum Kum	1	9	
Total	6	28	29.29, P<0.0001

NS - Not significant, P<0.05 - statistically significant

Cosmetic allergens (P<0.0001) significantly more common in females.

Table - 9 : Comparison of plant allergens in males and females

Plant allergens	Male N=33	Female N=36	Statistical analysis X ² 'test.
Parthenium	9	3	4.13, P<0.05

NS - Not significant. P<0.05 - statistically significant

Parthenium (P<0.05) significantly more common in males.

Table - 10: Comparison of drug allergens in males and females

Drug allergens	Male N=33	Female N=36	Statistical analysis X ² test.
Neomycin sulphate	1	2	
Benzocaine	0	1	
Nitrofurazon	0	2	
Total	1	5	2.56, NS

NS - Not significant, P<0.05 - statistically significant

There was no significant difference statistically.

DISCUSSION

Allergic contact dermatitis is a hypersensitivity reaction to an exogenous Agent occurring after Contact with allergens substance. History and physical examination, although of remarkable importance, are inconclusive in definitive diagnosis because of the diversity of allergens in the environment. So far, patch test is known to be the most reliable test to diagnose allergic contact dermatitis identifies its etiologic agent. Previous studies have clarified that early diagnosis of allergic contact dermatitis by patch test would lead to a better quality of life, increased treatment responsiveness, and lowered treatment expenses. Moreover, identifying the etiologic agent and avoiding it, might prevent progression toward chronic non-remittable stages of the disease. [10]

In our study, males and females in this study group. Sharma, Chakrabarti and hammershoy reported higher rates of patch test positivity in females. [11] Akhtar, Rashid, Chowdhury, et al reported higher rates of patch test sensitivity in males. [12] If sensitivity to individual allergens is noted, some allergens are more flonly responsible in male and others in females. But overall increased. Incidence in male sex could be due to more exposure to various allergens as they are more involved in outdoor activities. Females especially in India are s involved in household work.

Duration of contact dermatitis varies depending upon the nature frequency, mode of exposure and lack of awareness about allergens and irritants on part of the patient. Inability to identify and avoid the causative agent as well as persistence of the antigen in the work environment may be responsible for chronicity of the lesions in contact dermatitis.

In our study duration of illness was specifically asked and a wide variation was noted. The most commonly observed period was 1-5 years, as seen in 57% of the patients. Sharma and Kaur⁵⁸ in their study reported that duration of contact dermatitis had varied from few months to few years. But Bajaj reported that more than 60% of the patients had disease for less than 6 months. This discrepancy may be due to ignorance, on part of patients due to illiteracy in Davangere and adjoining areas. [13]

Medicaments were responsible for contact dermatitis in six patients in our study. Neomycin was positive in 3 patients, nitrofurazone was positive in 2 patients and benzocaine in one patient. However, medicaments were responsible for a large percentage of cases in studies by Sharma and Kaur. [14] Medicament sensitization is known to increase with age as the person becomes exposed to a large number of medications because of the chronicity of their diseases.

In our study 6 patients were positive to paraphenylene diamine. Out of 6 cases 3 were males and 3 were females. In a study of 1000 patients by Saraswat, et al reported that 53 patients were allergic to paraphenylene diamine. [15]

Cobalt is another frequent sensitizer and allergy to this metal often accompanies chromate sensitivity in men and nickel sensitivity in women. [16] In the present series, it accounted for only 4% of the patients (males 3.0% and female 1.0%). Two cases of cobalt sulphate positivity in males were associated with potassium bichromate positivity. They were mainly construction workers. One male showed cobalat sulpahte positivity associated with nickel sulphate positivity. One female showed cobalt sulpahte positivity associated with nickel sulpahte positivity. This was in accordance with other studies. [17] However Singh and Singh could not find any case of cobalt sensitivity in their study of CD. [18]

Rubber articles are frequently used in day to day life and are responsible for sensitization in many patients. The natural rubber is not a sensitizer, but additives like

accelerators, activators and antioxidants added during processing are common sensitizers. In the present series, 11 patients showed positivity to mercaptobenzothiazole 6 males showed positivity to thiuram mix and 1 male to black rubber mix. Rubber sensitivity was found in 5% of females and 22.5% of males with HD by Sharma and Kaur. Similar findings were reported by Agrup and Calnan. [19]

Conclusion

In our study, the commonest allergens in our patients from hospital adjoining places were potassium bichromate, thiuram mix and parthenium in males, whereas nickel, fragrance mix and kumkum in females. In view of the differences in clinical patterns, positivity rates etc. reported from different parts of India, we owe it to our patients to clarify the epidemiology of this important problem. A multicentre study from all the major geographic areas of the country is required to initiate further studies in this matter.

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