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Original Research Article

Role of contact allergens in chronicity and relapses of nummular eczema

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ABSTRACT

Background: Endogenous eczemas are often complicated by exogenous factors like environment and contact allergens. Nummular eczema, a variant of endogenous eczema is no exception to this. Our study aimed at investigating the incidence of allergic contact dermatitis and finding offending agent responsible for chronicity or relapsing course of nummular eczema in patients from a hilly region with cold and dry environmental conditions.
Methods: Forty patients of nummular eczema with a mean age of 39.1±19 years were patch tested with the Indian Standard Patch Test Series. Positive reactions were graded as per recommendations of International contact dermatitis research group.
Results: Twenty one out of forty patch tested patients showed positive reactions. The most common allergens were found to be: fragrance mix in seven (17.5%) patients, nickel in five (12.5%) patients, PPD in three (7.5%) patients and gentamicin in two (5%) patients. Sensitivity to thiuram mix, black rubber mix, P. tert. butylphenol formaldehyde, neomycin, benzocaine and chinoform was observed in one patient each (2.5% each).
Conclusions: Patients of nummular eczema of a hilly region are at a significant risk of developing allergic contact dermatitis owing to xerosis due to dry environmental conditions. This results in chronic nature of their disease. Patch testing should be considered in such patients and avoidance of offending allergens can improve their quality of life.

Keywords: Nummular eczema, Dermatitis, Allergic contact dermatitis

INTRODUCTION

The origin of term 'eczema' is not clear. Eczema may be induced by a wide range of external or internal factors either singly or in combination and it can involve any part of the body. Exogenous eczema is related clearly to defined external triggering factors whereas endogenous eczema is mediated by processes originating within the body.

The term nummular eczema, also known as discoid or orbiculare eczema was first coined by Devergie in 1857.[1] Nummular eczema is a common type of endogenous eczema characterized by coined shaped lesions of closely set, thin walled vesicles on an erythematous base. Most forms of nummular eczema relapse at long or short intervals and are often associated with xerotic skin changes during winter or dry months of the year.[2] It is characteristic of the disease that patches which have apparently become dormant may become active again.

Little is known about etiopathogenesis of nummular eczema. Numerous causative factors, both single or in combination predisposing to or precipitating nummular eczema have been proposed in literature viz. bacterial infection, role of atopy, allergic contact dermatitis, varicose veins and lower leg edema, dietary factors, environmental factors, systemically administered drugs etc.[3-8]

Contact sensitization to different allergens has been proposed as one of the causative factor. There are few studies on incidence of allergic contact dermatitis in patients with relapsing nummular eczema from India, and perhaps none from a hilly region of the subcontinent. Our study aimed at investigating the incidence of allergic contact dermatitis and finding offending agent responsible for chronicity or relapsing course of nummular eczema in patients from a hilly region with cold and dry environmental conditions.

METHODS

Forty patients diagnosed to have relapsing nummular eczema were recruited in the study for patch testing in the department of Dermatology of a tertiary care centre i.e. Indira Gandhi Medical College, Shimla, Himachal Pradesh. Ten patients having other minor skin diseases but no signs and symptoms of dermatitis served as controls for patch testing.

Clinical details of the patients including occupation profile were taken with special attention to history of aggravation of symptoms on contact with any of the sensitizers. Also, exacerbation of lesions in reference to season was noted. Dermatophytic infection was ruled out in all the patients by taking scrapings from the lesions and microscopically analyzing a KOH preparation of the same. Complete work-up for an infective pathology was done if history/finding suggestive of an infection was seen in any of the recruited patient.

The patch test antigens included 25 common allergens taken from the Indian standard series as shown in Table 1.

The patch test was applied on non-hairy, lesion free skin, usually over upper back of the patient after explaining the procedure and obtaining written consent for the same.

Table 1: Patch test battery – Indian Standard Series (ISS).

Serial no.	Allergen	Concentration (%)	Vehicle
1.	Petrolatum (control)	100	
2.	Potassium dichromate	0.5	Petrolatum
3.	Neomycin sulphate	2.0	"
4.	Cobalt chloride	1.0	"
5.	Benzocaine	5.0	"
6.	PPD (p-phenylenediamine)	1.0	"
7.	Parabens	15.0	"
8.	Nickel sulphate	5.0	"
9.	Colophony	20.0	"
10.	Gentamicin	20.0	"
11.	Mercapto Mix	2.0	"
12.	Epoxy resin	1.0	"
13.	Fragrance Mix	8.0	"
14.	Mercaptobenzothiazole	2.0	"
15.	Nitrofurazone	1.0	"
16.	Chlorocresol	1.0	"
17.	Wool Alcohols	30.0	"
18.	Balsam of Peru	25.0	"
19.	Thiuram mix	1.0	"
20.	Chinoform	3.0	"
21.	Black rubber mix	0.6	"
22.	P-tert. Butylphenol Formaldehyde resin	1.0	"
23.	Formaldehyde	1.0	Aqueous
24.	Polyethylene Glycol 400	100.0	"
25.	Parthenium	0.1	Petrolatum

Patches were removed at 48 hours and the patients were instructed to avoid scratching and wait for one hour for the skin to regain its normal contour and non-specific skin irritation to subside. Sites were then examined for reactions. Second reading was taken at 72 hours. Readings of patch test were taken at 48 & 72 hours in all patients, and if needed patients were called at 96 hours for reading of late reaction. The reactions were scored as

recommended by International contact dermatitis research group (ICDRG).

Relevance of patch test result was defined as

- Definite- If the reaction was positive to patch test allergen, object or product containing the suspected allergen.
- Probable- If the substance identified by patch test could be verified as present in the known skin contactants of the patient.
- Possible- If the patient was exposed to circumstances in which skin contact with material known to contain the putative allergen likely occurred.
- Past- If a positive patch test reaction could be explained by a previous and unrelated episode of contact dermatitis.
- Unknown- If there was no evidence of relevance even after extensive investigations.

RESULTS

Of the forty patients of chronic relapsing nummular eczema who were recruited for patch testing, there were 27 males and 13 females. The mean age of patients was 39.1±19 years (range 13-75 years). The occupational profile of these patients included – students (32.5%), office workers and house hold workers (15% each), retired (12.5%), teachers (7.5%), farmers (5%) and carpenter, peon, police, shopkeeper, physical trainer (constituting 2.5% each) as shown in Figure 1.

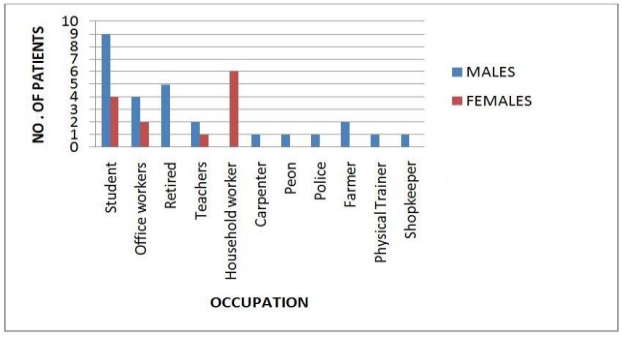

Figure 1: Occupation profile of patients.

Lower limbs was the most commonly affected site i.e. in 29 (72.5%) patients and thirty three (82.5%) of patients had lesions over more than one site.

The duration of dermatitis varied from nine months to twenty years (mean duration-66±65.5months). Out of forty patients, twenty three (57.5%) patients reported exacerbation of lesions and symptoms in winter season.

Patch test results

Patch test results were positive in twenty one (52.5%) patients. Seventeen (42.5%) patients showed positivity to a single antigen, three (7.5%) patients showed positivity to two antigens and one (2.5%) patient showed positivity to three antigens as in Figure 2.

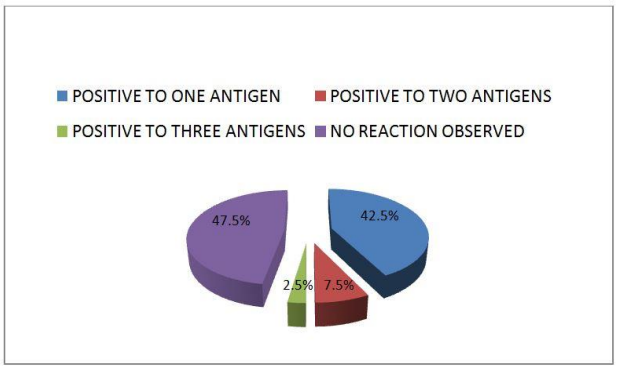

Figure 2: Positive reaction to number of antigens.

Out of 21 patients, who showed positive patch test result to different antigens, maximum number i.e. 16/21patients (76.19%) had lesions over lower limbs, followed by 9/21 patients (42.85%) over upper limbs; 6/21 patients (28.57%) over trunk; 5/21 patient (23.85%) over hands and 3/21patients (14.28%) had lesions over feet.

Most common allergen was found to be fragrance mix in seven (17.5%) patients, five (12.5%) patients were sensitive to nickel, three (7.5%) patients showed sensitivity to PPD and two (5%) patients to gentamicin. Sensitivity to thiuram mix, black rubber mix, P. tert. butylphenol formaldehyde, neomycin, benzocaine and chinoform was observed in one patient each (2.5% each). Two patients (one sensitive to nickel and another to PPD) showed exacerbation of dermatitis in the subsided lesions of nummular eczema. Results of positive patch reactions according to occupation and age of the patients along with duration and site of dermatitis were summarized in tabular form and analysed as given in Table 2.

The most common sensitizer detected in patch test was in cosmetics (25%), followed by metals (20%), drugs and leather/rubber (7.5% each) and in adhesives (2.5%) as shown in Table 3.

Exacerbation of dermatitis in subsided lesions of nummular eczema was noted in two patients on application of patch test (one sensitive to nickel and another to PPD). Age and sex matched controls without nummular eczema, also patch tested with ISS patch test battery, showed no positive reaction.

DISCUSSION

Little is known about pathophysiology of nummular eczema but is frequently accompanied by xerosis.[2] Likely cause of nummular eczema suggested in literature is combination of impairment of cutaneous barrier and an immunological reaction. The epidermal lipid barrier is breached owing to dryness of skin, thus allowing

permeation of various allergens and inducing allergic or irritant response.[2,9] Aoyama et al, in their study found that in comparison to age matched controls, patients with nummular eczema showed increased sensitivity to environmental aeroallergens.[2] In series by Jiamton et al two third of the nummular eczema patients had co-existing dryness of skin.[10]

Table 2: Details of positive patch test results.

Occupation	Age	Duration of dermatitis	Lesions present over	Patch test positivity grade
Lecturer	35 years	2 years	LL, Trunk	Ni 3+ with exacerbation of lesions
House wife	42 years	1.5 years	Hands, UL	Co 2+
Clerk	48 years	2 years	LL	Co 2+
Sr. Assistant	57 years	10 years	Hands, LL	Ni 2+
Carpenter	55 years	5 years	Hands, Feet	Co l+
Rtd. Kanungo	61 years	10 years	LL	Frag. Mix 3+
Rtd. Postmaster	66 years	1.5 years	Trunk	PPD 3+ with exacerbation of lesions.
Student	17 years	2 years	UL,LL	Thiuram mix 1+
Clerk	43 years	6 years	Hands	PPD 2+, Frag mix 2+
Office assistant in bank	30 years	2 years	Feet, LL	Ni 2+
House wife	38 years	2 years	UL,LL, Trunk	Gentamicin 2+
Student	13 years	1 year	UL, LL	Black rubber mix 1+
Student	14 years	9 months	UL,LL, Trunk	P. tert. Butyl phenol formaldehyde 1+
Farmer	65 years	16 months	Feet	Frag mix 2+
Police	49 years	9 years	UL, LL	Frag mix 3+, Chinoform 1 +
House wife	41 years	1 year	UL,LL, Trunk	Ni 3+
Physical trainer	30 years	15 months	LL, Trunk	Frag mix 3+
Shopkeeper	37 years	2 years	LL	Frag mix 2+
Junior Engineer	36 years	1 year	UL, LL	Ni 3+
Student	15 years	7 years	UL, LL	Neomycin 2+, Gentamicin 1+
Auditor	57 years	20 years	Hands, LL	Benzocaine 2+, PPD 3+, Frag mix 2+

*Abbreviations: LL- Lower Limb, UL- Upper limb, Frag mix- Fragrance mix, Co- Cobalt, Ni- Nickel, PPD- para- phenylenediamine.

Table 3: Distribution of positive reactions according to the categories of allergens.

Category of allergens	No. Of patients	Percentage
Cosmetics	10	25
Fragrance mix	7/10	
PPD	3/10	
Metals	8	20
Nickel	5/8	
Cobalt	3/8	
Drugs	4	10
Neomycin	1/4	
Gentamicin	2/4	
Benzocaine	1/4	
Rubber/leather	3	7.5
Thiuram mix	1/3	
Black rubber mix	1/3	
Chinoform	1/3	
Adhesive	1	2.5
P. tert. butylphenol formaldehyde	1/1	

In our series twenty two (57.5%) patients reported exacerbation of dermatitis in winter season. In hilly regions, cutaneous barrier is impaired secondary to xerosis. Therefore, patients of nummular eczema here are at a significant risk of developing secondary allergic contact sensitivity. This, in turn, contributes to chronicity and severity of their dermatitis.

Allergic contact dermatitis is an abnormal reaction (cell-mediated immune response) of the skin in response to various external agents. Worldwide, the prevalence of allergic contact dermatitis ranges from 1.5% to 5.5% in general population.[11] In India, it accounts for 10-15% of dermatological patients.[12]

Allergic contact dermatitis has been found to be common in patients with persisting nummular eczema. Patch testing has become a standard method of investigating patients with suspected allergic contact dermatitis. Rajgopalan et al demonstrated that patch tested patients have a better prognostic outcome as evidenced by a decrease in disease severity index.[13] Hence, testing with a standard series is useful when the offending agent cannot be detected despite of careful history and clinical examination.

Morrow et al concluded that hypersensitivity to aloe can also manifest as eczematous lesions of nummular eczema.[14] Patrizi et al reported thiomersol as cause of nummular eczema in five atopic children after patch testing.[15] Also, depilating creams and mercury leaching out of dental amalgam can cause nummular eczema.[16,17]

In series of Narendra et al, 100 patients suspected to have allergic contact dermatitis were patch tested with ISS.[18] Forty four patients showed one or more positive reaction. The frequent sensitizers observed were nickel sulphate, potassium dichromate, cobalt chloride, colophony, fragrance mix and thiuram mix.

In a study by Fleming et al, twenty four (50%) patients of nummular eczema had positive patch test reaction and 33% of these were clinically relevant.[6] The most common allergens implicated were rubber chemicals, formaldehyde, neomycin, chrome and nickel.

Krupa Shankar et al observed significant reaction in 23 out of 50 patients of nummular eczema who were subjected to patch test.[7] The most common sensitizers in their series were nickel sulphate, neomycin, nitrofurazone and colophony (7.14% each). In their series, nine patients reacted to one antigen while fourteen patients reacted to more than one.

In another study by Khurana et al, 28 patients (56%) of nummular eczema showed positive reaction on patch testing.[19] Potassium dichromate was the most common allergen (20%), followed by nickel (16%), cobalt chloride and fragrance mix (12% each) in decreasing order of frequency.

In our study twenty one (52.5%) patients showed positive patch reactions. Of these, seventeen (42.5%) patients showed positivity to single antigen; three (7.5%) patients showed positivity to two antigens and only one (2.5%) patient showed positivity to three antigens. Most common allergen found in our patients was fragrance mix i.e. in seven (17.5%) patients, five (12.5%) patients were sensitive to nickel, three (7.5%) showed sensitivity to PPD and two patients showed positive reaction to gentamicin. Sensitivity to thiuram mix, black rubber mix, P. tert. butylphenol formaldehyde, neomycin, benzocaine and chinoform was present in one patient (2.5%) each.

Fragrance mix was the commonest allergen in Hong Kong, whereas in series by Sharma et al, it was the fifth most common sensitizer.[20,12]

Most common sensitizer in our studies was fragrance mix which is a mixture of cinnamic aldehyde and alcohol. Its exposure occurs commonly through cosmetics, toiletries, food items, other household products and industrial products. In series of Krupa Shankar et al reaction to topical medications, cosmetics and toiletries constituted 64% of the reactions.[7] The most common sensitizers detected in our series were in cosmetics (25%) i.e. fragrance mix in seven, and PPD (found in hair dyes which cross reacts with parabens) in three patients.

Sensitization to metal like nickel is frequent as nickel is ubiquitous. In series by Khurana et al Potassium dichromate and nickel were the most common allergens in patients with nummular eczema i.e. 20% and 16% respectively; whereas in our series five (12.5%) patients were sensitive to nickel.[19]

Allergy to components of topical preparations is common in patients suffering from chronic dermatitis. Pasricha et al reported contact sensitivity to neomycin in 28% of their patients of suspected medicament contact dermatitis.[21] In series by Narender et al topical antibiotics and preservatives together accounted for 22 cases of contact dermatitis (27.5%), and is a major cause of iatrogenically induced dermatitis.[18] In our series two (5%) patients showed positive reaction to gentamicin and one (2.5%) to neomycin.

CONCLUSION

This study was planned keeping in view the cold climate of Himachal Pradesh which leads to xerosis of skin and impaired cutaneous barrier. It had an objective of finding out the incidence of allergic contact dermatitis and common contact sensitizers in patients of nummular eczema in this region which might be responsible for relapsing and chronic course of the disease. Our study

suggests that in patients with chronically relapsing course of nummular eczema, a possibility of overlying allergic contact dermatitis should be considered. It becomes important to do patch testing with a standard series in patients with nummular eczema to prevent the chronicity by avoiding offending contact allergens. Quality of life can be improved and exacerbations can be reduced in patients of nummular eczema by taking care of xerosis and counselling them on the basis of patch test results.

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Ethical approval: The study was approved by the institutional ethics committee

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