

# Common allergens in patients of chronic eczema by patch testing with European standard series

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**Abstract** *Objective* To determine the common allergens in patients with chronic eczema by applying European Standard series.

*Methods* This study was conducted at the Dermatology Department Unit II KEMU/Mayo Hospital, Lahore. Seventy five patients aged 12 years and above of either sex having chronic eczema were enrolled. Patients using oral corticosteroids and immunosuppressive drugs during the last 15 days, as well as, pregnant females were excluded from the study. Each patient was patch tested with allergens of European Standard series. Positive reactions were observed and recorded after 48, 72 and 120 hours, according to *International Contact Dermatitis Research Group Criteria*.

*Results* There were a total of 75 patients, 37 females and 38 males. Their age ranged from 13 to 45 years. Mean duration of the disease was 2.25 years. Positive reactions were noted in 52% of patients. Most common allergens were potassium dichromate (24%), nickel sulfate (17.3%), cobalt (17.3%) and tixocortol (10.4%).

*Conclusion* More than 50% of cases with chronic eczema reacted positively to various allergens so patch test must be applied to such patients to determine its cause. Metals were the mains allergens detected.

**Key words**

Chronic eczema, patch test, Europeans standard series.

## Introduction

Eczema covers a wide range of skin problems affecting people at different stages of their lives. It is a group of chronic relapsing and remitting disorder comprising 19% to 25% of dermatological outpatient consultations.<sup>1</sup> Eczema is broadly classified into endogenous and exogenous varieties. Endogenous variety includes atopic, seborrheic, discoid, pompholyx, and hand eczema. Exogenous includes allergic, irritant contact dermatitis and photo dermatitis.

Eczema has the tendency to become chronic and then be complicated by allergic contact dermatitis. Allergic contact dermatitis occurs when an allergen comes into contact with previously sensitized skin due to cell-mediated hypersensitivity or immunity. Patch test is used to detect the allergens so that corrective measures may be taken. It has the potential to improve the quality of life in these patients.<sup>2,3,4</sup> It has been recommended that all patients with chronic dermatitis must be patch tested, keeping in view the indefinite course of disease.<sup>5</sup>

Various studies have shown that chronic eczema may be complicated by contact dermatitis due to various other allergens. This may be due to an impaired cutaneous barrier. Krupa *et al.*<sup>4</sup> patch

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tested patients with chronic eczema and revealed that most frequent sensitizers were colophony, nitrofurazone, neomycin sulphate and nickel sulphate (7.14% each). Carlsen in a retrospective study of patch testing in an eczema population with European standard series (ESS) found sensitivity to be 34.5%.<sup>5</sup> Patients with chronic eczema are at significant risk of developing secondary allergic contact dermatitis. Patch testing with ESS helps us to identify common allergens which may be responsible for the development of allergic contact dermatitis in chronic eczema so that preventive and therapeutic measures can be adopted, thus leading to improved quality of life of the patients and decreasing the economic burden.

This study was undertaken to determine the common allergens in patients of chronic eczema by patch testing with ESS.

## Methods

This was a descriptive case study conducted in Dermatology department, Unit-II, Mayo Hospital, Lahore From 15<sup>th</sup> September 2009 till 15<sup>th</sup> November 2010. The calculated sample size was 75 cases. Non-probability purposive sampling was done. Patients aged  $\geq 12$  years belonging to either sex, having chronic eczema were included in the study. Patients using corticosteroids and other immunosuppressive drugs during the last 15 days, as well as, pregnant females were excluded from the study.

After informed consent, relevant history was taken and clinical examination was performed. All the information was recorded in the pre-designed proforma. Patch testing was performed at least 15 days after complete resolution of signs and symptoms of eczema and after complete withdrawal of the drugs. Each patient was patch tested with allergens of ESS.

Patches were applied to the upper back and covered with transpore tape. Any activity, which was likely to dislodge the patches, was prohibited. Patches were removed after 48 hours. A hypoallergenic skin marker was used to mark the location of individual chambers. First reading was taken 15-20 min after removal of patches so that erythema due to tape settles. Second and third readings were taken at 72 and 120 hours after patch test removal. Positive reaction on any of these readings was considered positive. All the readings were taken by the same observer. Positive reactions were observed according to *International Contact Dermatitis Research Group Criteria*,<sup>6</sup> which are as follows:

- +? Doubtful reaction; faint erythema only
- + Weak positive reaction; erythema, infiltration, possibly papules
- ++ Strong positive reaction; erythema, infiltration, papules and vesicles
- +++ Extreme positive reaction; intense erythema and infiltration and coalescing vesicles
- IR Irritant reaction of different types
- NT Not tested

Age, sex, duration of the disease and frequency of positive patch test with ESS were the study variables. Quantitative variables, i.e. age and duration of the disease, were expressed as mean $\pm$ SD. Positive patch test results with ESS were presented by frequency and percentages.

## Results

A total of 75 patients were enrolled. There were 38 males and 37 females. The youngest patient was 12 years old while the oldest was 70 years old. Mean age was 29 years. Majority of the patients were between 21-30 years. Minimum duration of disease noted in our study was less than 6 weeks and maximum was 5 years. It was

**Table 1** Sensitivity of European standard series (n=75).

Allergen	%
Potassium dichromate	24
Nickel sulphate	17.3
Cobalt	17.3
Tixocortol	10.7
Fragrance mix. II	6.7
Sesquiterpene lactone mix	5.3
Thiuram mix	2.7
Neomycin sulphate	2.7
Colophony	2.7
Budesonide	2.7
Parabens mix	2.7

more than 3 years in 56% patients and between 1-3 years in 36% patients. There were 24 students, 18 laborers, 12 technicians and 15 housewives. Discoid eczema, hand eczema, pompholyx were the common morphological patterns.

Positive reactions were recorded in 52% of the cases. Most common allergens of ESS were potassium dichromate (24%), nickel (17.3%), cobalt (17.3%) [Table 1].

The adverse reactions observed during patch testing were pruritus and tape erythema. Miliaria was found in few patients. Aggravation of eczema was seen in 2 cases while angry back syndrome was seen in 1 patient.

## Discussion

This study aimed at determining the common allergens in patients of chronic eczema by applying patch test with ESS.

In our study, female to male ratio was 1:1 that is almost equivalent to ratios in international studies. Abhijit and Thappa in his study reported ratio of 1:1 in both genders in discoid eczema that was the most common type of chronic eczema in our study.<sup>7</sup> A study from Bangladesh showed similar results, as well.<sup>8</sup> Maximum

incidence was seen in 21 to 30 years of age which is comparable with other studies. According to another study dysidrotic eczema peaks in patients aged 20-40 years.<sup>9</sup> Women under 30 are more affected with hand eczema. This is the period of life in which people come in contact with the maximum number of allergens due to varied activities and exposure.

Patch test sensitivity to allergens was seen in 52% of the subjects in our study. Patch testing has yielded positive results ranging from 50% to 92.5% in other studies.<sup>10</sup> In a study by Fleming *et al.*<sup>11</sup> 50% of patients with nummular dermatitis showed positive patch test reaction. In an Indian study, 50% of patients with nummular dermatitis showed significant reactions with patch test.<sup>4</sup> A study from Turkey showed similar percentage.<sup>12</sup> Results of patch testing from an Indian study were positive in 46% of patients with chronic eczema.<sup>4</sup> Lower percentages of positive results were seen in other studies. Carlsen *et al.*<sup>5</sup> in a retrospective study of patch testing with European standard series found sensitivity in 34.5% of Danish people having eczema. Our results are in conformity with some other local studies, as well. In a study by Nadeem *et al.*<sup>13</sup> 56.5% of patients reacted positively to various allergens. Similar results were found in another study conducted by Arif and Haroon<sup>14</sup> where 50% showed positive results on patch testing. 44% patients of eczema reacted positively to various allergens according to a study by Mustafa *et al.*<sup>15</sup>

Similarities in our study with studies from Turkey and India could be due to similar geographical and environmental factors and exposure to same type of allergens. Difference with study from Denmark may be due to different working environment and genetic factors that decrease chances of sensitivity.

It appears that eczema becomes a chronic disease in majority of patients, most likely due to unidentifiable allergens to which the patient may be exposed. Our study showed that those who had the duration of less than 6 weeks were less likely to show positive results with patch test. So prolonged duration of eczema has more chances of sensitivity to various allergens.

In our study the most common allergen in ESS was found to be potassium dichromate (24%). Comparable results were seen in an Indian study where 27% reacted positive to potassium dichromate.<sup>16</sup> These similar results indicate same type of skin and almost similar exposure to things containing chromate in the two countries. Chromate exposure occurs when general population comes in contact with cement, leather, matches, gloves, paints, photocopy paper, detergents, bleaching agents and shaving creams. Western countries report decreased rate in chromate positivity. This is due to effective removal or substitution of chromium in various items, e.g. in cement ferrous sulphate has been added in place of chromate.<sup>17</sup> Some local studies show lesser number of patients with positive results i.e. 14%<sup>13</sup> and 16%.<sup>18</sup> Lesser percentages of results could be due to different group of patients in these studies and the number of cases enrolled was less. Higher numbers of positive results with potassium dichromate were probably due to high number of laborers (cement workers) in our study. Laborers are more exposed to various sources of chromate due to their profession.

Nickel and cobalt were second most common allergens found in our study (17.3% each). This is in contrast to other studies worldwide where nickel is most common allergen. In a Pakistani study of 200 patients, nickel sulphate (21%) was the commonest allergen followed by potassium dichromate (14%) and cobalt chloride (7.5%).<sup>13</sup>

Krupa and Shrestha<sup>4</sup> performed patch test in patients with eczema and among most frequent sensitizers was nickel sulphate (7.14%). A retrospective study in Turkey evaluated results of patch test in 542 patients. All these patients were patch tested with 32 allergens of an extended ESS. Nickel sulphate was the most frequent sensitizer (19.1%), followed by potassium dichromate (11.8%).<sup>12</sup> Similar results were seen in an Indian study with nickel being the most common allergen followed by potassium dichromate.<sup>16</sup> The prevalence of nickel allergy all over the world remains as high as nearly 10%. This is partly due to the high levels of nickel in artificial jewelry that is used by girls at an early age. Thyssen *et al.*<sup>19</sup> carried out a study in 2009. They tested inexpensive jewelry and hair clasps for nickel release using the dimethylglyoxime test. They found that 1/5th of purchased items released nickel in concentrations that can lead to nickel allergy. Similarly cobalt release from artificial jewelry has also been mentioned in literature.<sup>20</sup> Sensitivity to cobalt is related to exposure to jewelry or metal in clothing, dental plates, prosthesis, plastics, pigments and in various alloys. Pseudo cross sensitivity can also occur between nickel and cobalt.<sup>21,22</sup> This can be the reason of similar results of nickel and cobalt in our study.

ACD can occur in patients of chronic eczema. Routine patch testing is the only way to diagnose such cases. Addition of more series can further help in better management of patients with eczema and can improve their quality of life.

## **Conclusion**

More than half of the patients with chronic eczema show positive results with various

allergens. Resistant cases of such type of eczema must be patch tested to rule out ACD.

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