Journal of Pakistan Association of Dermatologists 2013;**23 (3)**:289-294.

Original Article

Frequency of allergic contact dermatitis in hand eczema patients with European standard and corticosteroid series

Uzma Sarwar*, Faria Asad, Zahida Rani**, Khawar Kurshid**, Sabrina Suhail Pal****

*Department of Dermatology, Shalamar Medical and Dental College & Shamalar Hospital, Lahore
**Department of Dermatology, Unit II, King Edward Medical University/Mayo Hospital, Lahore

Abstract

Objective To determine the frequency of allergic contact dermatitis in patients with hand eczema by patch testing with European standard and corticosteroid series.

Patients and methods One hundred and five patients of either sex having hand eczema, aged 12 years or above were enrolled in the study from dermatology outdoor department. After taking informed consent, patch test was performed a fortnight after complete resolution of signs and symptoms of eczema and after complete withdrawal of the drugs. Patch testing was done with European standard and corticosteroid series. Readings were taken 48, 72 and 120 hours after patches removal. Patch test reactions were graded according to international contact dermatitis research group criteria. Data was analyzed according to age, sex and percentages of positive patch test results.

Results Allergic reaction was recorded in 48.6% of patients with European standard series and 11.4% of patients with corticosteroid series. Common allergens detected with European standard series were potassium dichromate (21%), cobalt chloride (12%) and nickel sulphate (12%). Common allergens detected with corticosteroid series were tixocortol-21-pivalate (8.6%) and hydrocortisone-17-butyrate (4.76%).

Conclusion Almost half (48.6%) of the patients showed allergic reaction with European standard series and 11.4% of the cases gave positive results with corticosteroid series. Patch test needs to be performed with corticosteroid and European standard series in patients with hand eczema not responding to therapy.

Key words
Allergic contact dermatitis, hand eczema, European standard series, corticosteroid series.

Introduction

Hand eczema is a common form of eczema and is often chronic, distressing and a frequently disabling condition. According to a population-based retrospective study, the incidence of self-reported hand eczema was 5.5 cases per 1000 person per year.[1] Hand eczema has multifactorial etiology which may be endogenous or exogenous: either irritant or allergic or it may be a combination of both. One study showed that allergic, irritant and unclassified hand eczema accounts for 23.2%, 17.1% and 51.3%, respectively.[2] Atopic dermatitis and wet work is associated with increased risk.[3] Endogenous eczemas are diagnosed clinically while allergic contact dermatitis (ACD) is confirmed with

Address for correspondence
Dr. Uzma Sarwar,
Department of Dermatology,
Shalamar Medical and Dental College & Shamalar Hospital,
Lahore
Ph# 03334884070
E-mail: uzmasarwar@hotmail.com

patch testing. Irritant contact dermatitis (ICD) is a diagnosis of exclusion.

The commonest allergens causing sensitization in hand eczema are present in European standard series. Hand eczema is treated with a variety of topical and oral drugs depending on severity and chronicity of the disease. Topical corticosteroids are used most commonly to control the symptoms but contact allergy to corticosteroids is also known and diagnosis can be made with either patch testing or intradermal testing.[4] Allergic contact dermatitis due to corticosteroids may be due to active ingredients, vehicle component, preservative agents and fragrance.[5] The underlying mechanism is the development of delayed hypersensitivity against topical corticosteroids.[6] Contact allergy to corticosteroids is usually missed because the anti-inflammatory action they produce usually masks the clinical signs of contact dermatitis.[7]

Patients and methods

The study was conducted in the dermatology department, unit II, Mayo hospital, Lahore for duration of 14 months from September 2009 to November 2010. Calculated sample size was 105 cases with 6% margin of error and 95% confidence level. Patients of either sex with hand eczema, aged 12 years and above presenting to outpatient department were enrolled in the study. Any patient on systemic corticosteroids or any other immunosuppressive therapy during last 2-4 weeks, determined on history was excluded from the study. Pregnant ladies were also not patch tested. After taking informed consent from patients, a detailed history was taken and clinical examination was performed on first visit. All the information was recorded in the pro forma. Eczema was treated.

Patch testing was performed a fortnight after complete resolution of signs and symptoms of eczema and after complete withdrawal of the drugs. The patch testing was done with allergens of European standard series (ESS) and corticosteroid series. The patches were applied to the upper back and covered with hypoallergenic transpore tape. The patients were advised to refrain from exposing the patch test area to moisture or sweat and to avoid strenuous exercise which could dislodge the patches. Patches were removed after 48 hours. Individual chamber's location was marked with a hypoallergenic skin marker. Results were read after tape erythema settled down. A second and third reading was done at 72 and 120 hrs after patch test removal. The patch test reactions were graded according to the international contact dermatitis research group (ICDRG) criteria[8] (**Table 1**); +, ++, +++ were considered as positive reaction.

Collected information was transferred to SPSS version 11.0 computer software program and was analyzed accordingly. The study variables were age, sex and positive patch test results. The age being quantitative variable, was expressed as mean±SD.

Table 1 International contact dermatitis Research group criteria (*ICDRGC).*

Skin changes	*Interpretation*
No skin lesion	Negative (-)
Faint erythema only	Doubtful reaction (+ ?)
Erythema, infiltration, possibly papules	Weak positive reaction (+)
Erythema, infiltration, papules and vesicles	Strong positive reaction (++)
Intense erythema and infiltration and coalescing vesicles	Extreme positive reaction (+++)
Irritant reaction of different types	(IR)
Not tested	(NT)

Table 2 Sensitivity to allergens of European standard series and corticosteroid series (n=105).

Allergen	*N (%)*
European standard series	
Potassium dichromate	21.0%
Cobalt chloride	12.0%
Nickel sulphate	12.0%
Fragrance mix	6.7%
Sesquiterpene lactone mix	5.7%
Fragrance mix II	3.8%
Thiuram mix	2.9%
Neomycin sulphate	2.9%
Colophony	1.9%
n-isopropyl-n-phenyl-4-phenylenediamine	1.9%
Benzocaine	1%
Wool alcohols	1%
Formaldehyde	1%
Cl+me-isothiazoline	1%
Methyldibromoglutaronitrile	1%
Corticosteroid series	
Tixocortol-21-pivalate	8.6%
Hydrocortisone-17–butyrate	4.7%
Budesonide	1.9%
Betamethasone-17-valerate	1.0%
Clobetasole-17-propionate	1.9%

Table 3 Patients with different occupations showing positive results (n=105).

Occupations (n)	*ESS N (%)*	*CS N (%)*
Laborers (24)	16	4
Students (33)	12	3
Housewives (22)	10	2
Office workers (17)	10	2
Technicians (9)	3	1
Total	51	12

CS= Corticosteroid series, ESS= European standard series.

The sex and frequency of contact dermatitis with European standard and corticosteroid series being qualitative variables were expressed in percentages. Other variables as most common allergen of European standard and corticosteroid series were also noted.

Results

Study was conducted on 105 patients. Fifty eight (55.2%) were males and 47 (44.8%) were females. Male to female ratio was 1.23:1. The youngest patient was 14-year-old and the oldest was 70-year-old. Mean age of presentation of females was 25.8 years and of males was 34.5 years. Out of 105 patients who presented to us with hand eczema, 33 were students, 24 laborers, 22 housewives, 17 office workers and 9 technicians. Most common presentations were of discoid eczema and pompholyx. Next in frequency were fingertip and dry palmar type of eczema.

Allergic reactions were recorded in 48.6% of patients with European standard series and 11.4% of patients with corticosteroid series. Sensitivity to different allergens is shown in **Table 2**. Polysensitivity was recorded in 22 patients with European standard series and 4 patients with corticosteroid series.

The commonest allergen detected with European standard series was potassium dichromate (21%). The next in frequency were cobalt chloride (12%) and nickel sulfate (12%). Among corticosteroid series the most common allergen detected was tixocortol-21-pivalate (8.6%) followed by hydrocortisone-17-butyrate (4.76%). Types of eczema showing highest rate of positive reactions with European standard series included discoid (14.3%), fingertip (8.6%), pompholyx (7.6%) and dry palmar type of eczema (7%).

Corticosteroid series showed highest rate of positive reactions with discoid eczema (4.8%).

Different occupations showing positive reactions are shown in **Table 3**.

Discussion

In our patients hand eczema was higher in males than females with the ratio of 1.23:1. Incidence and prevalence of this type of eczema varies in different published studies. Smith *et al.*[9] over a period of 15 years research concluded that men were more commonly affected with male to female ratio calculated as 0.8. This is in contrast to other studies in which females are most commonly affected. Meding and Jarvholm[1] reported that females are affected more than males with male to female ratio of 1:1.77. In a study conducted in Sweden, 1-year prevalence of hand eczema was calculated and male to female ratio was 1:1.66.[10] However, Meding and Jarvholm[1] concluded that there was no difference in incidence rates between women and men above 30 years of age.

Greater number of males presented to us which may be due to the reason that in our social set up females are engaged in the household work and child care at home and have less chance to move out. Even affected ones never consult a medical practitioner as they are mostly dependent on males.

Females presented at a younger age than males in our study. The mean age of presentation for females was almost a decade younger than their male counterparts. This is comparable with various other studies.[9,11] This might be due to their early involvement in household work, under family and social obligation in our country. Due to lack of fully automatic washing machines for clothes and dishes, hands are frequently exposed to the detergents and wet work.

Patch testing with European standard series revealed positive reactions in 48.6% of patients in our study which is comparable with most of the other multicentre studies. Lin-Feng *et al.*[12] studied hand eczema patients in China and concluded that total positivity rate was 55%. Results from a contact dermatitis clinic in Israel during the 7 years period showed positivity in 43.5% of the patients.[13] Similarly, 44% of the patients showed positive reaction in a study conducted in Europe[14] and it was 54.7% in a study from Hong Kong.[15] A study conducted in Mayo Hospital, Lahore, Pakistan on hand eczema by Akbar[16] reported allergic reactions in 46% of her patients, which is comparable with our study.

Few other studies revealed a high percentage of positive results in hand eczema. Bajaj *et al.*[17] reported 59% while a percentage of 69.1% was obtained by Davis *et al.*[18] at Mayo Clinic.

The variability in results from different countries may be due to disparity in geographic conditions, industrial exposure and socio-economic environment. Results from Indian studies differ from us as they included patients presenting with different types of eczema including hand eczema. Furthermore they used an indigenous series of allergens which does not exactly match the European standard series.[17]

Most common allergen detected by European standard series in our study was potassium dichromate which is 21%, whereas cobalt chloride and nickel sulphate were next common with 12% sensitivity each. This is in contrast to other studies conducted previously. Nickel sulphate was the commonest sensitizers according to the international studies.[13,15,17,19] Other sensitizers which are next to nickel sulphate are potassium dichromate, cobalt chloride and fragrance mix in most of the studies.[13,20,21]

Among occupations which showed positive results, most of the patients were laborers and then were the students and housewives. Potassium dichromate was the most common allergen detected in our study because the greatest numbers of patients which showed positive results were laborers. Even large numbers of females are engaged in the laborious work with their male partners in our country. This is the reason that we have highest sensitivity with potassium dichromate in our study. In other part of the world, addition of ferrous sulphate to the cement had led to the decrease sensitivity to potassium dichromate in construction workers.[22]

Patch testing with corticosteroid series showed positivity in 11.4% of the patients. Similar results were obtained by Davis *et al*.[20] who reported that patch testing in corticosteroid allergic patients confirm allergy is 10.69%. Gonul *et al.*[6] reported higher sensitivity of 22% of his patients. This might be due to the reason that they specifically performed patch testing on the patients who were not showing response to the topical corticosteroid treatment.

Most common allergen in corticosteroid series detected in our study was tixocortol-21-pivalate (8.6%) followed by hydrocortisone-17-butyrate (4.76%). Tixocortol-21-pivalate is an established marker to topical corticosteroid allergy[23] and cross-reactivity between tixocortol-21-pivalate and hydrocortisone is well known due to their close molecular resemblance.[24] Lutz *et al.*[23] reported 2.9% sensitivity while Gonul *et al.*[6] reported higher value of 14.6% with tixocortol-21-pivalate.

Results of our study show that in patients of hand eczema which becomes chronic and difficult to treat, the possibility of ACD to topical corticosteroids should be considered, as they are commonly used to treat hand eczema, Diagnostic patch testing would be an invaluable tool to rule in or rule out ACD and would help in better management of the patients in terms of improving the quality of life.

Conclusion

It is mandatory to patch test each patient of chronic and difficult to treat hand eczema to detect the etiological allergens in the standard series or corticosteroid series.

References

1. Meding B, Jarvholm B. Incidence of hand eczema- a population based- retrospective study. *J Invest Dermatol* 2004;**122**:873-7.
2. Lin-Feng L, Guangren L, Jing W. Etiology and prognosis of hand eczema in a dermatology clinic in China: a follow-up study. *Contact Dermatitis* 2008;**58**:88-92.
3. Lerback A, Kyvik KO, Ravn H *et al*. Incidence of hand eczema in a population – based twin cohort: genetic and environmental risk factors. *Br J Dermatol*. 2007;**157**:552-7.
4. Mimesh S, Pratt M. Allergic contact dermatitis from corticosteroids: reproducibility of patch testing and correlation with intradermal testing. *Dermatitis.* 2006;**17**:1377-42.
5. Goosens A, Medeiros S. Allergic contact dermatitis from topical medicaments. *Expert Rev. Dermatol* 2008;**3**:37-42.
6. Gonul M, Gul U. Detection of contact hypersensitivity to corticosteroids in allergic contact dermatitis patients who do not respond to topical corticosteroids. *Contact Dermatitis.* 2005;**53**:67-70.
7. Dooms-Goossens A, Degreef H. Clinical aspects of contact allergy to corticosteroids. *Dermatology* 1994;**189**:54-5.
8. Beck MH, Wilkinson SM. Contact dermatitis: allergic. In: Burns T, Breathnach S, Cox N, Griffiths C, editors. *Rook's textbook of Dermatology, 8th ed.* London: Wiley-Blackwell; 2008. p.26.87.
9. Smith HR, Armstrong DK, Wakelin SH *et al*. Descriptive epidemiology of hand dermatitis at the St John's contact dermatitis

clinic 1983-97. *Br J Dermatol.* 2000;**142**:284-7.
10. Meding B, Liden C, Berglind N. Self-diagnosed dermatitis in adults. Results from a population survey in Stockholm. *Contact Dermatitis.* 2001;**45**:341-5.
11. Meding B. Differences between the sexes with regard to skin related skin disease. *Contact Dermatitis.* 2000;**43**:65-71.
12. Lin-Feng L, Guo J, Wang J. Environmental contact factors in eczema and the results of patch testing Chinese patients with a modified European standard series of allergens. *Contact Dermatitis.* 2004;**51**:22-5.
13. Aneta L. European standard series patch test results from a contact dermatitis clinic in Israel during a 7 year period from 1998-2004. *Contact Dermatitis.* 2006;**55**:73-6.
14. The ESSCA writing group. The European surveillance system of contact allergies (ESSCA): results of patch testing the standard series, 2004. *J Eur Acad Dermatol Venereol* 2008;**22**:174-81.
15. Lam WS, Chan LY, Ho SCK *et al*. A retrospective study of 2585 patients patch tested with the European standard series in Hong Kong (1995-99). *Int J Dermatol* 2008;**47**:128-33.
16. Akbar TM. Allergic hand eczema: a clinico-aetiologic study. [Dissertation]. Karachi: CPSP;1998.
17. Bajaj AK, Saraswat A, Mukhija G *et al*. Patch test experience with 1000 patients. *Indian J Dermatol Venereol Leprol* 2007;**73**:313-8.
18. Davis MDP, Scalf LA, Yiannias JA *et al*. Changing trends and allergens in the patch test standard series. A Mayo Clinic 5-year retrospective review, January 1, 2001, through December 31, 2005. *Arch Dermatol.* 2008;**144**:67-7.
19. Khan MS, Rani Z, Ahmed ML, Hussain I, Kazmi AH. Evaluation and pattern of nickel dermatitis in patients with allergic contact dermatitis. *J Pak Assoc Dermatol.* 2005;**15**:136-9.
20. Davis MD, El-Azhary RA, Farmer SA. Results of patch testing to a corticosteroids series: a retrospective review of 1188 patients during 6 years at Mayo clinic. *J Am Acad Dermatol.* 2007;**56**:921-7.
21. Akyol A, Boyvat A, Peksari Y, Gurgey E. Contact sensitivity to standard series allergens in 1038 patients with contact dermatitis in Turkey. *Contact Dermatitis.* 2005;**52**:333-7.
22. Roto P, Sainio H, Reunala T, Laippala P. Addition of ferrous sulfate to cement and risk of chromium dermatitis among construction workers. *Contact Dermatitis.* 1996;**34**:43-50.
23. Lutz ME, El-Azhary RA, Gibson LE, Fransway AF. Contact hypersensitivity to tixocortol pivalate. *J Am Acad Dermatol.* 1998;**38**:691-5.
24. Frankild S, Lepoittevin JP, Kreilgaard B, Andersen KE. Tixocortol pivalate contact allergy in the GMPT: frequency and cross-reactivity. *Contact Dermatitis.* 2001;**44**:18-22.