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Original Research Article

Clinical evaluation of common allergens in contact dermatitis to cement

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ABSTRACT

Background: Cement is the most common cause of occupational dermatitis in construction industry. Skin contact with cement results in irritant contact dermatitis ranging from cement burns to chronic cumulative irritant contact dermatitis. Chromate, cobalt, nickel, epoxy resins and rubber chemicals are the important allergens in construction workers. The objective of the study was to study various clinical pattern of distribution and association between the duration of exposure to cement and clinical manifestation in occupational group.
Methods: 107 cases of contact dermatitis with history of exposure to cement attending the occupational contact dermatitis outpatient department, Department of Dermatology, Rajiv Gandhi Government General Hospital and college, All the patients were subjected to blood investigation such as complete hemogram, liver function test, renal function test and absolute eosinophil count. Patient with history and clinical features suggestive of contact dermatitis due to cement were patch tested.
Results: Among 107 patients, the most common pattern of involvement includes extremities which account for 64 patients (59.8%) Involvement of face, neck, trunk and extremities was seen in 11 patients (10.3%). Among 81 positive patch test patients, chromium was positive in 78 patients (96.3%) followed by epoxy resin in 14 patients 17.3% and cobalt and thiuram mix in 9 patients (11.1%) each and the least was black rubber mix in 3 patients (3.7%).
Conclusions: This study emphasizes the need for standardization in the chrome content of cement. Strict workplace safety guidelines should be implemented from government to protect workers from developing contact dermatitis to cement.

Keywords: Contact Dermatitis, Cement exposure, Photo patch test, Eosinophilia

INTRODUCTION

Occupational skin diseases represent approximately 40% of all occupational illness. Regular contact with cement will produce occupational contact dermatitis and is most frequently reported. [1]American medical association defines occupational dermatosis as a pathological skin condition for which occupational exposure is found to be a major cause or contributing factor. Evidence for occupational dermatosis includes, occupational contact dermatitis is a significant hazard in the construction workers.[2] Cement is the most common cause of occupational dermatitis in construction industry. Skin contact with cement results in irritant contact dermatitis ranging from cement burns to chronic cumulative irritant contact dermatitis. It also causes occupational allergic contact dermatitis due to the exposure to various allergens in cements.[3] Chromate, cobalt, nickel, epoxy resins and rubber chemicals are the important allergens in construction workers. Chronicity and frequent relapse are common in cement contact dermatitis.[4] The worse

prognosis of the chrome allergy is due to secondary contact sensitivity to cobalt, nickel and rubber chemicals. Patch testing is used to diagnose allergic contact dermatitis. Josef Jadassohn is considered to be the founder of patch testing in 1895 while working in Breslau University. In 1911 Jadassohn's technique was improved by Brono Bloch at Basel. He introduced patch test grading and standard series of allergen, cross sensitization and systemic contact dermatitis.[5]

METHODS

The study was conducted in from March 2013 to November 2013, Department of Dermatology, Rajiv Gandhi Government General Hospital and college, Chennai. A detailed history of the patients including the age, sex, chief complaints, the type of occupation and the duration of exposure to cement in their occupation were noted. Based on the morphology and distribution of the lesion patients were diagnosed as neurosis, irritant contact dermatitis, allergic contact dermatitis, airborne contact dermatitis and airborne contact dermatitis with photosensitivity. Clinical pattern of distribution of the contact dermatitis was noted. History, symptoms and signs suggestive of atopy were noted. Family history of atopy was noted. Past history of similar illness and any drug intake prior and after the onset of lesions were noted. All the patients were subjected to blood investigation namely complete hemogram, liver function test, renal function test and absolute eosinophil count. Patient with history and clinical features suggestive of contact dermatitis due to cement were patch tested. Photo patch test was done in patient with photosensitivity. Patch testing was done for all the patients with the following allergens available in the Indian standard series approved by the Contact and Occupational Forum of India (CODFI) marketed by Systopic laboratories limited.

Statistical analysis

Results will be expressed as mean ± standard deviation and range. Unpaired' test will be used to compare the contact dermatitis patients p value of 0.05 or less than will be considered for clinical significance.

RESULTS

A total of 107 patients with a history of exposure to cement were included in the study. Based on history and clinical morphology, they were diagnosed as neurosis, irritant contact dermatitis, allergic contact dermatitis, airborne contact dermatitis and airborne contact dermatitis with photosensitivity. All the cases were patch tested and photo patch test was done in patient with history of photosensitivity.

Absolute eosinophil count of >440 cells/cu.mm was seen in 66.6% of atopic and 52.7% of non-atopic.

Table 1: Incidences of cement contact dermatitis.

Gender	Total OPD	Occupational contact dermatitis	Cement contact dermatitis
Males	1565	287	99
Females	1025	52	8
Total	2590	339	107

Table 2: Absolute eosinophil count (AEC).

AEC >440 cells/cu.mm	Atopic		Non atopic		Total	
	No.	**%**	**No.**	**%**	**No.**	**%**
Present	22	66.6	39	52.7	61	57
Absent	11	33.3	35	47.3	46	43
Total	33	100	74	100	107	100

Table 3: Clinical presentation in cement exposure.

Clinical presentation	Number	Percentage
Xerosis alone	3	2.80
Irritant contact dermatitis (ICD)	11	10.3
Allergic contact dermatitis (ACD)	79	73.8
Airborne contact dermatitis (ABCD)	8	7.48
ABCD with photosensitivity	6	5.61
Total	107	100

Among 107 patients, 79 (73.8%) had allergic contact dermatitis. This was followed by irritant contact dermatitis in 11 patients (10.3%), airborne contact dermatitis in 8 patients (7.48%), airborne contact dermatitis with photosensitivity in 6 patients (5.61%) and xerosis alone in 3 patients (2.8%).

Table 4: Patch test result.

Patch test	Atopy absent		Atopy present		Total	
	No.	%	No.	%	No.	%
Positive	56	75.67	25	75.75	81	75.70
Negative	18	24.32	8	24.24	26	24.30
Total	74	100	33	100	107	100

Among the atopic 75.75% had positive patch test whereas among the Nona topics, 75.67% had positive patch test. Thus atopy did not significantly influence the propensity for developing sensitivity.

Table 5: Patchestpositivity of specific allergens.

Allergen	Number	Percentage (%)
Chromium	78	96.3
Cobalt	9	11.1
Nickel	5	6.2
Epoxy resin	14	17.3
Thiuram mix	9	11.1
Mercapto mix	4	4.9
Black rubber mix	3	3.7

Among 81 positive patch test patients, chromium was positive in 78 patients (96.3%) followed by epoxy resin in 14 patients 17.3% and cobalt and thiuram mix in 9 patients (11.1%) each and the least was black rubber mix in 3 patients (3.7%).

Table 6: Photopatch test.

Photo patch test	Number	Percentage (%)
Positive	1	16.7
Negative	5	83.3
Total	6	100

In our study, photo patch test done in 6 patients with history of photosensitivity showed positive photo patch test reactions in 1 patient. Chromium was 1+ in patch test reaction and Ph. +++ in photo patch test.

DISCUSSION

Among the total eczematous skin condition attending our Occupational contact Dermatitis outpatient department which includes both endogenous and exogenous eczema, 339 patients had occupational contact dermatitis. Out of which 107 patients (31.2%) had occupational contact dermatitis to cement.[6] The higher incidence of contact dermatitis to cement was because of more people are being employed in construction working due to rapid industrialization and urbanization in and around Chennai, Tamil Nadu. In our study the most common presentation was allergic contact dermatitis consisting of 79 patients (73.8%) followed by irritant contact dermatitis in 11 patients (10.3%). English jet al in his study on occupational dermatitis in construction industry had reported allergic contact dermatitis in 71.2% of cement and construction workers.[7] White et al in his study on cement dermatitis in underground channel construction workers, has reported majority of cases with allergic contact dermatitis.[8] Irritant contact dermatitis to cement was not detected in Isfahan study on cement contact dermatitis by Gosh et al in his study on cement dermatitis and chromium allergy reported only 6.6% of irritant contactdermatitis.[9] Henschel among 81 positive patch test patients, chromium was positive in 78 patients (96.3%) followed by epoxy resin in 14 patients 17.3% and cobalt and thiuram mix in 9 patients (11.1%) each and the least was black rubber mix in 3 patients (3.7%).[10] According to Boman et al in a study on cement workers of Kuwait, all the 191 patients (100%) were sensitized to chromates and 13 patients (6.8%) were sensitized to cobalt.[11] In the study of Bryant et al in construction workers in Isfahan 63% of patient were sensitized to potassium dichromate.[12] Bruze et al in his study reported 80.9% sensitization to chromate.[13] Lovell et al found 54.65% of the cement workers were sensitized to chromates followed by epoxy resin in 12% and cobalt chloride in 9.5%.[14] Pruitt et al in his study reported the common allergen to be chromate in 70% of the patients. In our study chromium was associated with other allergen in 28 patients (34.5%).[15] Spoo, Elsner among the associated antigens Epoxy resin was the most common allergen associated with chromium in 13 (46.4%) patients followed by cobalt in 9 patients (32.2%) and thiuram mix in 8 patients (28.6%) and nickel in 4 patients (14.2%).[16] Cobalt and nickel present in cement are in insoluble state that has very low sensitization potential. Thus sensitization to these metals is very rare and is mainly due to damage caused secondary to chromateallergy. Cobalt had concurrent positivity with chromium in all the 9 patients (100%).[17]

CONCLUSION

This study emphasizes the need for standardization in the chrome content of cement. Change of work is nearly impossible in India because of lack of alternative job. Strict workplace safety guidelines should be implemented from government to protect workers from developing contact dermatitis to cement. Cement manufacturing companies should implement any scientific measures to decrease the chromate or epoxy resin allergy in cement. Limitation of this study was that patch test was not done for hardwoods which also acts as sensitizers in masons as antigens were not available for them.

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