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Experience and feasibility of patch testing in allergic contact dermatitis in rural population

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Abstract

Context: The true incidence of allergic contact dermatitis (ACD) in a society is very difficult to estimate since its diagnosis depends on several factors. Patch testing is a useful tool to detect the allergens and improve the quality of life. **Aims:** The study was undertaken to determine the clinical pattern of ACD and find the causative allergen using patch test at a Rural Tertiary Care Center. **Settings and Design:** A 1-year study of 60 patients suspected with ACD was carried out at the Department of Dermatology. Demographic variables, clinical history, and examination were carried out. **Subjects and Methods:** Patch testing was done after a week of subsidence of active eczema utilizing the Indian Standard Series containing 20 allergens. Results were read on 2nd and 3rd day. Grading of the reactions was done based on the International Contact Dermatitis Research Group guidelines. **Statistical Analysis Used:** Descriptive analysis was used. **Results:** Of 60 patients, 60% were males and 40% were females. The most common site affected was hand in 56.66% followed by head and neck in 33.33% and feet in 21.66%. Positive result to patch test was seen in 51.33% patients. The most common allergen was *Parthenium* in 23.33% patients followed by fragrance mix in 11.66% patients. Grade 1 positivity was seen in 73.91%, 17.39% showed grade 2, 7.24% showed grade 3, and only 1.44% showed grade 4 positive reaction. **Conclusions:** In this era of urbanization and cosmetics, it is very important to keep the provisional diagnosis of ACD in all suspected cases of eczema, and a patch testing should be recommended. It helps in saving healthcare resources and decreasing the financial burden. Such studies at a large scale will help in establishing the prevalence of particular allergen in that area and help in spreading awareness in the community.

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Full Text

INTRODUCTION

Skin is exposed to a spectrum of chemical and biological products leading to a steady rise in the incidence of allergic

sensitization. Many adverse reactions such as hyperpigmentation, hypopigmentation, acne, urticaria, atrophy, phototoxic reactions, and eczema occur when skin comes in contact with external agents. Irritant contact dermatitis accounts for approximately 80% of all contact dermatitis while allergic contact dermatitis (ACD) accounts for the remaining 20%. [1]

ACD develops in only a small proportion of sensitized individuals varying from 1.7% to 6%. [2],[3] However, the true incidence of ACD in a society is very difficult to estimate since its diagnosis depends on several factors such as demographic profile of patients, local industrial development, index of suspicion of physician, and availability of patch testing. Diagnosing ACD by identifying the culprit allergen and avoiding it at earliest holds the keystone in management and prevention of ACD.

Patch testing is a very useful tool used to detect the allergens. [4] It is also used to establish the diagnosis of ACD and to exclude suspected allergens. It has the potential to improve the quality of life in such patients. [5] This study was undertaken to determine the clinical pattern of ACD and confirm the common causative allergen with the help of patch test at a rural-based Tertiary Care Center.

SUBJECTS AND METHODS

The study was carried out from April 2012 to March 2013 in the Department of Dermatology, Venereology, and Leprology at Shree Krishna Hospital, Karamsad, Gujarat, after approval from Human Resource and Ethical Committee of the institute.

Totally, 60 patients with suspected ACD were enrolled. Demographic variables, clinical history, and examination were carried out. To find the etiologic agent for a particular type of eczema, attention was paid to the presenting complaints, past history of allergy, occupational history, and seasonal aggravation. History, regarding habits, hobbies, correlation with the usage of particular items such as medicaments, cosmetics soap, jewelry, etc., was asked. Associated dermatological or systemic disease if any was noted. Pregnant and lactating women, patients with extremes of age (<5 years, more than 80 years), and immunocompromised individuals were excluded from the study.

Corticosteroids and other immunosuppressive were stopped 7 days prior. Patch testing was done after a week of subsidence of active eczema utilizing the Indian Standard Series approved by Contact and Occupational Dermatoses Forum of India and supplied by Systopic Laboratories, New Delhi which contained 20 allergens [Figure 1]. Allergens were put in Finn chambers and applied over the back of the patient. Results were read on 2nd and 3rd day. Grading of the reactions was done based on the International Contact Dermatitis Research Group guidelines. [6]{Figure 1}

RESULTS

Totally, 60 patients were enrolled of which 36 (60%) were males and 24 (40%) were females. Youngest patient was 9 years old and oldest was 71-year-old with mean age of 39.08 years [Table 1].{Table 1}

Maximum patients in males were belonging to laborer/farmers (30.55%) group whereas among females maximum were (62.5%) housewives [Table 2].{Table 2}

Only, 20 (33.33%) patients had a similar episode in the past. While only 2 (3.33%) patients had an atopic tendency. Majority of cases 47 (78.3%) had a gradual onset of symptoms, while 13 (21.7%) patients observed the sudden onset of symptoms. The most common complaint was itching in 51 (85%) patients followed by pigmentation in 45 (75%) patients. History of contact prior to the development of eczema was seen in 30% patients. In males, chemicals 11 (30.55%) and metals 6 (16.66%) were common contacts while in females chemical 7 (29.16%) and jewelry 7 (29.16%) were the leading contacts.

The most common site affected was hand [Figure 2] in 34 (56.66%) followed by head and neck in 20 (33.33%) and feet [Figure 3] in 13 (21.66%) patients [Graph 1]. Many patients had more than one sites involved. Both hand and feet eczema was seen in 10% patients. Acute phase of eczema was seen in 6 (10%) patients, while chronic eczema was seen in 23 (38.3) patients and maximum patients 31 (51.7%) presented with the subacute phase of eczema.

Positive result to patch test was seen in 31 patients (51.33%) of which 21 (67.74%) were males and 10 (32.25%) were females. The most common allergen was Parthenium in 14 (23.33%) patients followed by fragrance mix in 7 (11.66%)

patients [Table 3]. None of the patients showed a positive reaction to lanolin (wool alcohol), mercaptobenzothiazole, thiuram mix, and paraben mix. Vaseline (100%) was used as control.{Figure 2}{Figure 3}{Table 3}

In the present study, 51 (73.91%) reactions showed grade 1 positivity, 12 (17.39%) showed grade 2 positivity, and 5 (7.24%) showed grade 3 positivity. Only 1 (1.44%) out of total 69 positive reactions was grade 4.

DISCUSSION

Contact dermatitis accounts for 4-7% of all dermatological consultations. [7],[8] ACD occurs when an allergen comes into contact with the previously sensitized skin due to cell-mediated hypersensitivity or immunity[Figure 4],[Figure 5] and [Figure 6]. [9]{Figure 4}{Figure 5}{Figure 6}

In recent years, due to urbanization and increased usage of cosmetics, the trend of ACD is rising. The allergens included in standard series vary from country to country as well in the different regions of the same country based on the local experience.

In our study of 60 patients, it showed male: female ratio of 1.5:1 which was comparable with other large-scale studies. [1],[2],[3],[8] Increased male preponderance was seen because males are exposed to the more complex environment as compared to females.

Common age group affected was 41-60 years in males and 21-40 years in females which is comparable with a study by Sharma et al. [10] Early age of presentation in case of females can be attributed to the early age of ear piercing and cosmetic items usage, while in males it is occupational exposure during later life.

Pruritus in 85% followed by pigmentation in 71.66% patients is comparable with a study by Sudhashree et al. [11] showing itching in 89.4% and eruptions in 69.4% patients. Mean duration of symptoms in the present study was 2.38 years, with standard deviation (SD) of 3.31 years. While the study by Sudhashree et al. [11] and Davoudi et al. [12] had noticed longer duration of symptoms with mean $\pm$ SD = 3.4 ± 4.9 years and 4.46 ± 5.14 years, respectively.

Majority 61.66% patients had the aggravation of lesions following contact with the specific substance, which is higher than a study by Sudhashree et al. [11] in 52.9% patients. Very few patients had other aggravating factors such as exposure to sun (5%), sweating (3.33%), cleaning (3.33%), and friction (1.66%), while 25% patients did not notice any aggravating factor.

Positive history of atopy is seen in 3.33% patients, which is lower than a study by Bajaj et al. [3] It is due to large sample size in their study.

Studies from Delhi [10] and Chandigarh [12] recorded airborne contact dermatitis as the most common pattern followed by hand eczema whereas our study showed the most common clinical pattern as hand eczema in 56.66% followed by head and neck in 33.33% and feet in 21.66% patients. Both hand and feet eczema was observed in 10% patients, which is higher than study by Sharma and Kaur [13] (6.5%) and lower than study by Sharma and Kaur [14] (15.45%).

Females being housewives whereas males being laborers, masons or industrial workers frequently come in contact with a variety of agents either irritants or allergens in addition to the trauma of rubbing and scrubbing. Hand eczema was seen in 56.66% in our study comparable with Rani et al. [15] showing 50% cases. In hands, dorsa and sides of fingers were the most common site in 85.29% patients followed by dorsa of hands in 44.11% patients, and palmar surface 20.58%. Similar type of finding was observed by Laxmisha et al. [16] also.

Of total hand eczema, patch test positivity was seen in 50% individuals of which 26.47% patients were positive to Parthenium hysterophorus followed by fragrance mix and potassium bichromate in 14.7% patients each.

Higher incidence of fragrance positivity was also recorded by Dixit et al. [17] in 16% patients. It might be due to:

The fragrance cause the hand dermatitis in an individual who had prior sensitization to perfumes The housewife's eczema possibly due to cumulative insult or to vegetables, fruits, etc., predispose sensitivity to perfume present in soap and detergentsThe positive reaction is not relevant to dermatitis.

The uniqueness of our study was that the patients presenting with hand and feet eczema showed positivity with Parthenium, which is a proved allergen to cause airborne contact dermatitis. It is due to the rampant growth of *P. hysterophorus* and workers working with unprotected hands and feet.

Higher chromate sensitivity among patients of hand eczema was reported by other studies also from India. [9],[16] Chromates are present in cement, leather, matches, bleaches, yellow paints, varnishes, glues, soap, and detergents. Occupational exposure to chromates, thereby increasing the risk of contact sensitivity could explain the high number of positive patch test reactions in males. Currently, there are no legislative measures in India as compared to developed country, where ferrous sulfate is added which converts the more sensitizing hexavalent chromate to less sensitizing trivalent chromate (because it is less easily absorbed) decreasing the risk of sensitization in construction workers. [15]

Head and neck was second most common site affected with 33.33% patients in our study.

Parthenium was the commonest allergen with 30% patients. It is attributed to their work in the farm, overgrowth of Parthenium plant in the rural and suburban area. The commonest clinical pattern was airborne contact dermatitis due to Parthenium, observed in many studies from different parts of India [10],[11],[12],[13] as well.

Nickel sulfate reactivity was detected in 20% patients with head and neck eczema while Thyssen et al. [18] reported 25% positivity with hand eczema. The prevalence of nickel allergy all over the world remains high as nearly as 10%. This is partly due to the high levels of nickel in artificial jewelry which is used by girls at an early age.

Fragrance mix and paraphenylenediamine (PPD) had showed positive reaction in 15% patients. Fragrance mix is the ingredient of perfumes, deodorant, detergent, and soap while PPD is found in hair dye. Relevance of these positive reactions has been explained by higher proportion of cosmetic items used by both females as well as males.

Feet was the third common site affected in 21.66% of patients. Positive reactions to one or more allergens were seen in 53.84%. Positivity to Parthenium was seen in 30.76% patients followed by potassium bichromate in 23.07% patients. Farming and construction work associated with occupational exposure may be the reason, as patients fail to protect their feet with shoes. Only 3.3% females of feet eczema had shown positive reaction, one to fragrance, and other with PPD. Reaction to the former may be due to fragrances been used in detergent while reaction to later was due to dye been used in black colored footwear, also reported by and Ghosh [19] and Saha et al. [20]

Patch test positivity was seen in 51.66% patients, which was higher than Narendra and Srinivas [2] but lower than other studies [Table 4].

Parthenium was the commonest allergen in 23.33% patients comparable with other studies [Table 5].{Table 4}{Table 5}

Traditionally, Parthenium dermatitis is reported to have male predominance, especially in farming countries. Moreover, our Tertiary Care Centre is situated where majority of patients come from rural area where farming is the main occupation. Rampant overgrowth of this plant in the cities and suburbs could possibly explain the increased contact sensitivity in housewives and people of profession other than agriculture also.

Fragrance mix positivity was found in 11.66%, observed in different studies also. [9],[10],[11] Increase usage of cosmetic items in both males and females might be the reason.

The majority of 54.83% were positive for multiple allergens and 45.17% were positive for the single allergen. The majority of the reactions, that is, 38 (55.88%) were positive on both day 2 and day 3, 9 (13.23%) were positive on day 2 only, and 21 (30.88%) on day 3 only. These figures are higher than the results obtained by Shehade et al. [21] who found that 24% of their 4210 allergic reactions studied were negative on day 2 but turned out to be positive on day 4. This means that 30.88% of the cases would have been missed if only the day 2 readings had been taken into consideration. Hence, both day 2 and day 3 readings are significant from the diagnostic point of view.

As skin is the only barrier between environment and body in this era of urbanization and cosmetics, it is very important to keep the provisional diagnosis of ACD in all suspected cases because it may present in various patterns. Hence, patch testing should be done in all cases after subsidence of the acute phase of eczema in patients who do not improve despite adequate treatment. Those patients who are allergic to particular allergen should be counseled regarding their occupational exposure or lifestyle modification for the same. It is important to avoid those allergens in day to day activity in order to withhold the disease as well as to prevent future recurrence. Ultimately, it helps in saving healthcare resources and decreasing the financial burden of the patients and community.

Such studies at large scale in the Tertiary Care Centre will help in establishing the prevalence of particular allergen in that area and may be useful from community point of view by spreading awareness. Working habits, hygienic measures, and photoprotection are of paramount importance in preventing ACD.

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Conflicts of interest

There are no conflicts of interest.

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