Allergic Contact Dermatitis and Patch Test Responses in Atopics

Ayanlowo OO

Ayanlowo OO, Akinkugbe AO, Olumide YM.

The Dermatology Unit, Department of Medicine, College of Medicine, University of Lagos. PMB 12003, Lagos, Nigeria

E-mail: *solayan05@yahoo.com*

ABSTRACT

Introduction: The frequency of atopic dermatitis (AD) in patients with allergic contact dermatitis (ACD) varies between 13-68%. There are certain similarities in the clinical presentations of patients with atopic dermatitis and allergic contact dermatitis.

Objectives: This study aimed to determine frequency of atopic dermatitis among patients with allergic contact dermatitis at the skin clinic of the Lagos University Teaching Hospital (LUTH) between September 2003 and October 2004. It will also highlight the difference in patch test responses in the atopics and the non atopics.

Methods: All consecutive patients with features of allergic contact dermatitis were examined for features of atopic dermatitis using refined Hannifin and Rajka criteria (1980) and patch tested. Clinical features of ACD in the patients with atopy were documented using a self-administered protocol. The patch test responses in atopics and non atopics were compared using the chi square test and the odds ratio (OR).

Results: Thirty six (35.3%) of the 102 patients who presented with features of allergic contact dermatitis during the study period were found to be atopics. There was a female preponderance of atopics with allergic contact dermatitis (male to female ratio 1:2.3). Twenty four (66.7%) of the atopic patients patch tested had features of chronic dermatitis. Nickel sulphate, potassium dichromate, cobalt chloride and fragrance mix were the most common allergens found in the atopics in descending order.

Conclusion: There was no statistically significant difference in the patch test responses between the atopics and the non atopics.

INTRODUCTION

BOTH allergic contact dermatitis and atopic dermatitis are immunologic conditions with different immunopathophysiology. Atopic dermatitis (AD) is a type 1 hypersensitivity reaction in which patients present with features of chronic relapsing skin disease[1,2]. The diagnosis of atopic dermatitis is based on the Hanifin and Rajka criteria (1980)[1,3]. The major criteria include pruritus, chronic relapsing dermatitis, personal or family history of disease, typical distribution and morphology of the rash which include face and extensor surfaces in children and flexural lichenification in older children and adults[3]. Atopic dermatitis affects males and females equally and occurs at all age[1,4]. Patients have periods of complete remissions, and by the age of 15 years 75% of AD patients will be in remission[4].

Work done in various parts of the country over a 25-year period revealed an increasing prevalence: 3.1% in 1986 (Lagos)[5]; 6.1 % Ibadan (1989)[6], 5.2% in Lagos (2004)[7]. 8.5% in 2004 (Enugu)[8]; and 7.92% in 2007 (Benin)[9]. In Lagos, Nigeria, a prevalence of about 15.5% was found amongst consecutive paediatric dermatology patients[10]. Allergic contact dermatitis (ACD) is a type 4 (delayed) hypersensitivity reaction resulting from cutaneous contact with a specific antigen to which the patient has developed a specific sensitivity[11].

Various prevalence studies of allergic contact dermatitis carried out in Nigeria put the prevalence at between 4.8% and 7.8%[12-14] which is comparable with what is obtained in the US which is 4-7%[15]. The prevalence of atopic dermatitis in patients with allergic contact dermatitis varies between 13-68%[16]. It was initially assumed that atopics should have an increased tendency to develop allergic contact dermatitis because both are immunologic processes. However, contrary to this, atopics have been noted to have a reduced tendency to allergic contact dermatitis[17]. This

was thought to be due to the fact that persons with atopic dermatitis have a functional deficiency of T suppressor lymphocytes hence have a lower risk than non atopics to develop ACD[16]. A study done by the International Contact Dermatitis Research Group revealed that atopics are more likely to develop ACD than other endogenous dermatitis[18].

There are certain similarities in presentations of atopic dermatitis and allergic contact dermatitis; making them close differentials. They both present in adult blacks with features of chronic eczema[1,19]. Allergic contact dermatitis superimposed on atopic dermatitis often presents as intractable, persistent and atypical dermatitis[18]. In a series, incidence of allergic contact dermatitis to topical agents was 16.7% which is rather high[20]. This was probably due to the fact that management of atopic dermatitis involves the use of a wide range of topical medications like corticosteroids, antibiotics and moisturizers[18]. Atopic dermatitis is a major risk factor in the etiology of hand eczema and it is associated with increased frequency[21]. Atopic dermatitis can closely mimic clothing dermatitis: long sleeve shirts and blouses dermatitis affect the neck and antecubital fossae and trouser dermatitis affect the popliteal fossae which is the same distribution found in atopic dermatitis[18].

This study aimed to determine the frequency of atopic dermatitis in a group of patients with allergic contact dermatitis and to highlight the pattern of clinical presentation of allergic contact dermatitis in atopics. It also compared the patch test responses in the atopics and non atopics; and the allergens causing allergic contact dermatitis in the atopic patients.

METHOD AND MATERIALS

All consecutive patients who presented with features of allergic contact dermatitis between September 2003 and October 2004 were examined for features of atopic dermatitis using the UK refined Hanifin and Rajka diagnostic criteria. This comprises of an itchy skin condition with 3 or more of the following: onset below age of 2, history of skin crease involvement, history of generalized dry skin, self history of atopy and visible flexural dermatitis[22]. The sociodemographic data and the clinical features of the patients with features of atopy were documented using the self-administered questionnaire. All the patients were patch tested using the Hermal European standard series of allergens. The allergens were applied to the upper back in the Finn chambers secured with Scanpor tape. The tests were read after 48 hours. The readings were done forty-five minutes after removal of the patches. Results were graded according to the International Contact Dermatitis Research Group (ICDRG) standard. Positive reactions were those with at least an infiltrated erythema (one + reaction).

The data and the patch test result were analyzed using the Epi Info software. The statistical inferences were presented using tables. The patch test responses in atopics and non atopics were compared with the chi square test and the odds ratio (OR). The observed differences between the two samples were considered statistically significant when $P < 0.05$ or the confidence limit did not embrace unity.

RESULTS

Altogether one hundred and two patients with features of allergic contact dermatitis were patch tested. Thirty six patients (35.3%) had atopic dermatitis while 66 patients (64.7%) were non atopics. Amongst the atopics patch tested, there were 11 males and 25 females with a male to female ratio of 1:2.3. The age range of the atopics was 3 to 68 years. The age distribution is as shown in Table 1. Associated irritant contact dermatitis was found in 8 atopics; and the irritants included detergents, soaps, shampoos, insecticides, herbal concoctions and hair products. Six patients including a theatre nurse, a housewife and a hairdresser who were atopics presented with hand dermatitis and irritant contact dermatitis. One of the atopics with hand dermatitis also had cosmetic allergy to her body cream.

Amongst the atopics, 12 patients (33.3%) had acute eczema, 18 patients (50%) had acute on chronic eczema while 6 patients (16.7%) had chronic eczema. Altogether, 24 of the atopic patients (66.7%) presented with features of chronicity which are lichenification, hyperpigmentation, hypo or depigmentation. Table 2 shows the locations of lesions in atopics that were patch tested.

PATCH TEST RESPONSES IN ATOPICS

Amongst the thirty six patients that had history and clinical findings suggestive of atopy: 24 (23.5%) had positive patch test results whilst 12 (11.8%) had negative patch test results (Table 3). There was no statistically significant difference in positive response to patch test between atopics and non-atopics. (OR 2.9; p value = 0.066). Table 4 shows the various allergens responsible for CD in atopics patch tested. Nickel sulphate, potassium dichromate, cobalt chloride and fragrance mix were the most common allergens accounting for 25%, 16.7% and 12.5% respectively of positive patch test response in atopics patch tested.

DISCUSSION

The frequency of atopic dermatitis in patients with ACD in this study was 35.3% using the Hannifin and Rajka major criteria. Other studies put the frequency of atopic dermatitis in patients with allergic contact dermatitis between 13-68%[16]. There was a female preponderance in the number of atopics with ACD. The female preponderance may be due to the fact that women are more aware of their skin and are more likely to do jobs that predispose them to an overlap of atopic dermatitis, allergic contact dermatitis and irritant contact dermatitis like housewives, hairdressers, nurses and cooks. Women play more roles than men in house cleaning and care of small children that predispose them more to cutaneous irritants[23].

Allergic contact dermatitis in atopics occurred at all ages in this study just like atopic dermatitis is found at all ages. Since atopic dermatitis is most common in infancy and childhood, it may be expected that ACD in atopics will be high in childhood. However, this study showed that allergic contact dermatitis is lowest at the extremes of ages in the atopics and that the highest prevalence of ACD in atopics is during early adulthood between ages 21 and 30 (36.1%). Allergic contact dermatitis is noted to be most prevalent between ages 21 and 40 [13,14].

Altogether 8 patients (24%) who were atopics presented with irritant contact dermatitis complicating their allergic contact dermatitis. This was not surprising as irritant contact dermatitis is a common complication of atopic dermatitis especially in hand dermatitis[21]. Our study showed an overlap of allergic contact dermatitis, atopic dermatitis and irritant dermatitis in six patients who were females and also had occupational contact dermatitis: two nurses, three hairdressers and one housewife. This was likely to be due to repeated exposures to irritants like soaps, detergents, cosmetic chemicals and solvents in the course of their work[23]. Twenty four (66.7%) of the atopic patients patch tested presented with features of chronicity. This is not different from previous report that atopic dermatitis superimposed on allergic dermatitis is a cause of persistent and intractable dermatitis[18].

Our study which is comparable to some early studies in other environment did not reveal a statistically significant difference in positive response to patch test between atopics and non atopics[24-26]. Nickel sulphate followed by potassium dichromate and cobalt chloride were the commonest contact allergen in the atopics with allergic contact dermatitis accounting for 25%, 16.7% and 16.7% respectively of the positive patch test responses. This is similar to a study done in Turkey which revealed nickel sulphate and potassium dichromate as the commonest sensitizers in atopics with ACD in that environment[25].

It was initially assumed that atopics should have an increased tendency to develop allergic contact dermatitis because both are immunologic processes. However, contrary to this, atopics have been noted to have a reduced tendency to allergic contact dermatitis17.

In conclusion, majority of atopics (66.7%) with allergic contact dermatitis presented with features of chronicity, and the commonest allergens implicated were nickel sulphate, potassium dichromate and cobalt chloride. Furthermore, our study showed that atopics are as likely to have allergic contact dermatitis and positive patch test responses as non atopics hence atopics should be patch tested just as non atopics when they are suspected of having ACD. Although further study is necessary, patch testing atopics for aetiological diagnosis of allergic contact dermatitis may be one of the keys to preventing chronicity. ■

REFERENCES

1. Correale CE, Walker C, Murphy L, Craig TJ. Atopic dermatitis: a review of Diagnosis and Treatment. American Family Physician *1999; 15: 1-6*.
2. Sharma AD. Allergic contact dermatitis in patients with atopic dermatitis: a clinical study. *Indian J. Dermatol Venereol Leprol 2005; 71: 96-98*.
3. Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. *Acta Dermatol Venereol (Stockh) 1980;92:44-47*.
4. Leung DYM, Eichenfield LF, Bogniewicz M. Atopic Dermatitis (Atopic Eczema). In Fitzpatrick's Dermatology in General Medicine. (Eds) Freedberg IM, Eisen AZ, Wolff K, Austen KF, Goldsmith LA, Katz

SI. McGraw-Hill Companies inc. 2003; 6th Ed; pp 1180-1194.

5. Olumide YM. The Incidence of Atopic Dermatitis in Nigeria. *Int J Dermatol 1986; 25(6): 367 368*.
6. George AO. Atopic dermatitis in Nigeria. *Int J Dermatol* 1989; 28(4): 237-239.
7. Olumide YM. What has the skin got to do with it. Inaugural lecture series 2004, University of Lagos press, pp 56.
8. Nnoruka Edith N. Current Epidemiology of Atopic Dermatitis in South East Nigeria. Int J Dermatol 2004; 43(10): 739-744.
9. Onunu A.N. Clinical profile of atopic dermatitis in Benin City, Nigeria. *Niger J Clin Pract. 2007; 10(4):326-9*.
10. Odusote OA. Atopic dermatitis in children attending the skin clinic at the Lagos University Teaching Hospital. National postgraduate Medical College of Nigeria 2002 (Dissertation).
11. Hogan D, Belsito D, Vinson RP, Callen JP, Gelfand JM, Gross PR. Contact Dermatitis, Allergic. *eMedicine 2005; 8: 1-11*.
12. Soyinka F. Contact Allergic Dermatitis "Current topics in Tropical Dermatology". *Nig. Med J. 1978; 8: 6: 518-25*.
13. Olumide YM. Contact Dermatitis in Nigeria. *Contact dermatitis 1985; 4:241-246*.
14. Ayanlowo OO, Olumide YM. Current pattern of patch test results at the skin clinic of the Lagos University Teaching Hospital, Nigeria. *Int J Dermatol 2011; 50: 372-374*.
15. Mendenhall RG, Ramsay DL, Girard RA. A study of the practice of Dermatology in the United States. *Arch Dermatol 1978; 114:1456-62*.
16. Schopf E, Baumgartner A. Patch testing in atopic dermatitis. J Am Acad Dermatol 1989; 21: 860-2.
17. Burns T, Breathnach SM, Cox N, Griffiths (Editors). Rook's textbook of Dermatology. Beck MH, Wilkinson SM. Contact Dermatitis, Allergic. *7th Ed. United Kingdom, Blackwell Science 2004; 20:1-18*.
18. Fisher AA. Contact dermatitis. Allergic contact dermatitis. *2nd Edition. New York: Lea and Ferbiger 1973; 4-11*.
19. Kashani MN, Goroushi F, Behnia F, Nazemi MJ, Dowlati Y, Firoz A. Allergic contact dermatitis in Iran. *Contact Dermatitis 2005; 52: 3: 154-158*.
20. Sato K, Minami H. Contact dermatitis in atopic patient: Incidence of contact dermatitis from topical agents with atopic dermatitis. *Environ Dermatol 1997; 4: 20-24*.
21. Nilsson E, Mikaelson B, Anderson S. Atopy, occupation and domestic work as risk factors for hand eczema in hospital workers. *Contact dermatitis 1985; 13: 216-233*.
22. Williams HC, Burney PGJ, Pembroke AC, Hay RJ. The U.K. Working Party's Diagnostic criteria for Atopic Dermatitis. III. Independent hospital validation. *Br J Dermatol 1994; 131: 406-416*.
23. Hogan D, Wilkinson JD, Wells MJ, Krusinski P, Quirk C, Elston DM. Contact Dermatitis, Irritant. *eMedicine 2004; 9: 1-15*.
24. Goh CL. Contact dermatitis in atopics and non atopics. An epidermiological study. *Environ Dermatol 1997; 4: 15-19*.
25. Akasya-Hillenbrand E, Özkaya-Bayazit E. Patch test result in 542 patients with suspected contact dermatitis in Turkey. *Contact Dermatitis 2002; 46: 1:17-23*.
26. Klas PA, Corey G, Storrs FJ, Chan SC, Hannifin JM. Allergic and irritant patch test reactions and atopic diseases. *Contact Dermatitis 1996; 34: 2:121-4*.

TABLES

Table 1: Age distribution of atopic patients with allergic contact dermatitis patch tested

Age (years)	Number of patients	% of patients
0-10	3	8.3
11-20	5	13.9
21-30	13	36.1
31-40	5	13.9
41-50	6	16.7
51-60	2	5.6
>60	2	5.6

Location of lesions	Number of patients	% of patients
Lower limbs	20	55.6
Face and neck	10	27.8
Flexures	7	19.4
Hand	6	16.7
Trunk	4	11.1
Generalized	4	11.1
Upper & fore arm	3	8.4
Abdomen	1	2.8

Table 2: Location of lesions in atopics patch tested

	No of Patients (+ve)	No of patients (-ve)	Total
Atopics	24	12	36
Non-atopics	36	30	66

Odds Ratio = 2.9; X^2 = 3.37; P Value = 0.066 (> 0.05)

Table 3: Comparison of patch test response in atopics and non atopics

Allergens	Number of positive responses	% of positive responses
Nickel sulphate	6	25.0
Potassium dichromate	4	16.7
Cobalt chloride	4	16.7
Fragrance mix	3	12.5
Balsum of Peru	2	8.3
Paratertiary butyl-formaldehyde resin	2	8.3
Colophony	2	8.3
Thiuram mix	1	4.2
Formaldehyde in water	1	4.2
Neomycin	1	4.2
N-Isopropyl-N-phenyl	1	4.2
Paraphenylenediamine		
N-5-Chloro-2methyl-4-isothiazo-line 3+methyl-1, 4-sothiazole-3-1 (in water)	1	4.2

Table 4: Frequency of allergen responses in atopics