

Report

Clinico-etiological profile of hand dermatitis and patch response of patients at a tertiary hospital in Lagos, Nigeria: results of a prospective observational study

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Abstract

Background Hand dermatitis is an acute or chronic inflammation of the skin of the hands from a multifactorial cause which may be endogenous, exogenous, or a combination of both. With a wide range in severity and recurrent periods of flares, it has significant impact on the quality of life of its sufferers. A history of atopy predisposes patients to hand dermatitis, but contact dermatitis, either allergic or irritant, is the more commonly implicated factor in the etiology of hand dermatitis. Patch testing is an important tool in identifying the allergen responsible for allergic hand dermatitis, and this knowledge will contribute to improved management.

Aim and Objectives This study was undertaken to evaluate the clinical and etiologic profile and review the patch responses of patients who presented with hand dermatitis at a foremost tertiary skin clinic in the most populous state of the most populous country in Africa.

Methods A prospective, observational study in which consecutive walk-in patients who fulfilled the inclusion criteria were enrolled. Ethical clearance was obtained. Study tools included self-administered questionnaires, physical examination, and patch tests (European Hermal series), amongst others. The patch tests were carried out. Results were documented, and treatment was individualized based on clinical and investigation findings. The results were collated and analyzed with SPSS® 17.0 edition (SPSS II).

Results Hand dermatitis was seen in 177 (13.3%) patients who presented during the study period. The mean age was 34.6 ± 17.4 years. Almost two-thirds of patients (119; 67.2%) had chronic hand dermatitis, while 53 (32.8%) presented acutely. Patch responses were positive in 65 (36.7%) patients with paraphenylenediamine identified as the most frequent cause. Respondents had at least one (+) response to 20 of the 28 allergens, while there was no response to eight of the allergens in the European series.

Conclusion The study reveals that hand dermatitis is present in a younger age group and a variety of subtypes coexist. Locally sourced allergens are needed to improve the yield of patch responses.

Introduction

Dermatitis is an inflammatory reaction of the skin to varied insults with clinical presentation of the classical signs of inflammation. The word dermatitis is interchangeably used with eczema, meaning to break out or boil over.¹ When the skin of the hands is solely or primarily involved, it is referred to as hand dermatitis (HD). It is a chronic disease with periods of exacerbations and remissions causing significant morbidity and reduction in quality of life. There is a point prevalence of 9.7% in the general population in northern Europe with probable higher figures in the United States in settings of managed care.² Similar

studies quote the incidence to be 5.5–8.8 per 1000 person-years.³ Hospital-based studies in Nigeria reported high frequencies of eczemas with numbers between 8.8 and 30.2%^{4–6} with HD accounting for 0.7–21.6% of all dermatitis. Both sexes are equally affected, and the disease is seen across all ages.^{6,7}

The etiology is multifactorial with a combination of endogenous and exogenous factors. For appropriate management of HD, risk factors and etiologies have to be elicited with the history. Irritant contact dermatitis (ICD) has been found to be the most prevalent cause of HD followed by allergic contact dermatitis (ACD) and atopic dermatitis (AD).⁷ The presence of fungal infections may be super infections or perpetuators of HD, as

well as inciting agents of inflammation in atopic patients. They can also cause irritant dermatitis of their own accord.^{8–11}

Allergic contact dermatitis is a Type 4 delayed hypersensitivity immune response of cutaneous contact with certain allergens from prior exposures in a sensitized individual. It involves both the innate and adaptive immunity, and different studies have shown that it accounts for about 15–20% of HD.^{7,12} Allergic contact dermatitis of the hands is less common than ICD and occurs in people who have developed a contact allergy to specific substances, such as rubber chemicals, nickel, or biocides.¹³ It is always acquired and may develop anytime during life.¹⁴ Sometimes it follows an ICD; for example, cement workers initially may get an irritant dermatitis and later develop ACD to chromate.

The role of patch testing in diagnosing ACD has been well emphasized because identifying and subsequently avoiding the implicated allergen will sometimes, but not invariably, control the disease.¹⁵ There is a paucity of data on African patients with HD who are managed with protocols from developed countries. There is the likelihood of variation in causative factors in the African setting compared with other parts of the world in view of environmental differences.

Aim and Objectives

This study was undertaken to document the clinical and etiological characteristics of HD and review the patch responses of patients at the skin clinic of a tertiary hospital in Lagos, the most populous state of Nigeria.

Methodology

This was a prospective observational study carried out at the Dermatology Clinic of the Lagos University Teaching Hospital (LUTH) in Nigeria. It is a federal government owned tertiary center which receives referrals from other centers in the country where there is no dermatologist, state-owned general hospitals, local government run primary healthcare centers, and private hospitals within Lagos and surrounding states. A total number of 177 consecutive walk-in patients who fulfilled the inclusion criteria were enrolled in the study, which took place over a 24-week period. Inclusion criteria were consenting patients with features of hand dermatitis (itching, scaly rash, blisters, vesicles, erythema or hyperpigmentation, lichenification, pain, excoriations, or fissures)^{7,16} as diagnosed by consultant dermatologists in the skin clinic and those willing to return for the patch test reading and follow-up visits during the study period. Those who admitted to the use of potent systemic corticosteroids within the week prior to being enrolled, as well as patients with diseases that had hand dermatitis-like presentations such as psoriasis, systemic syphilis, palmar, and plantar keratoderma (ruled out with skin biopsies), were excluded from the study.

Self-administered questionnaires were used to obtain data on demographics, symptoms and duration, personal or family

history of atopy, and perceived or suspected triggers. They were clinically examined, had skin scrapings for mycology studies, and patch tested with the European Hermal series. The patch test was reviewed 72 hours later, and responses were graded according to the International Contact Dermatitis Research Group (ICDRG) standard.¹⁷

Allergic hand dermatitis was diagnosed with positive patch responses in susceptible patients with clinical features of HD; atopic hand dermatitis was diagnosed in patients with a personal and/or a family history of atopy, and irritant hand dermatitis was seen in patients with a positive history of repeated triggers and a negative patch response. Skin scrapings for fungal studies were carried out on all patients with 20% potassium hydroxide (KOH) to rule out superimposed fungal infections.

Results were documented, and treatment was individualized based on clinical and investigation findings under supervision of the consultant dermatologists. Patients with secondary fungal infections evidenced by positive potassium hydroxide skin scrapings were managed appropriately with oral and/or topical antifungals. Each patient was re-examined at 6 weeks at the follow-up clinic.

Statistical analysis

The results from baseline and at follow-up were collated and analyzed with SPSS[®] 17.0 edition (SPSS IL). Descriptive statistics are presented as counts and percentages for categorical variables. Mean with standard deviation was used for normally distributed data, and Pearson chi-square was used where appropriate to test the association between categorical variables. Statistical significance was set at $P < 0.05$.

Ethical consideration

Approval for the study was sought and obtained from the Ethics and Research Committee of the Lagos University Teaching Hospital. A signed informed consent was obtained from each subject or custodian (for minors) after a detailed discussion of the study in the best understood language.

Results

Hand dermatitis was seen in 177 (13.3%) of the 1,329 new patients who attended the skin clinic during the period of study. There was a slight female preponderance with male:female 1:1.2, although not statistically significant. The mean age of the study population was 34.6 ± 17.4 years. Almost two-thirds of patients (119; 67.2%) had chronic hand dermatitis, while (53; 32.8%) presented acutely.

The MOAHLFA index

There were 80 (45.2%) males with HD, 53 (29.9%) had atopic dermatitis, 33 (18.6.0%) had leg (foot) dermatitis, and 59 (33.3%) of respondents were aged over 40 years. All the

patients studied had hand dermatitis, and face dermatitis was not considered in the methodology of this study. The most frequent work category was students (43; 24.3%).

Table 1 displays the demographics of the study considering the MOAHLFA index.

Recurrence of symptoms were experienced in 111 (62.7%) of respondents, while 66 (37.3%) said symptoms were persistent. A third of respondents (53, 29.9%) had current symptoms lasting less than 3 months signifying acute episodes, while 124 (70.1%) had chronic symptoms lasting longer than 3 months.

The most recurring symptoms were scaling (160, 90.4%) and itching (155, 87.6%). Less than half of the patients (86, 48.6%) had painful lesions. Figure 1 shows the frequencies of clinical features (symptoms and signs) and clinical photos of patients with hand dermatitis.

The majority of respondents (81, 45.8%) were not sure of the cause of their HD, while 36 (20.3%) of respondents thought it was related to water as they had recurrent symptoms after prolonged contact with water. Possible trigger factors/irritants noted by the respondents include wet work in 92 (52%) patients,

Table 1 Demographics and clinical data of patients considering the MOAHLFA index

Gender	Females <i>n</i>	%	Males <i>n</i>	%	Total <i>n</i>	%
Male	97	54.8	80	45.2	177	100
Occupational	34	19.2	29	16.4	63	35.6
Atopic dermatitis	32	18.1	21	11.9	53	29.9
Hand	97	54.8	80	45.2	177	100
Face	—	—	—	—	—	—
Leg	16	9.0	17	9.6	33	18.6
Age (years)						
Mean	32.7 ± 17.4		36.9 ± 17.1		34.6 ± 17.4	
Range	6–73		7–67		6–73	
>40	27	15.3	32	18.1	59	33.3

n, number of patients.

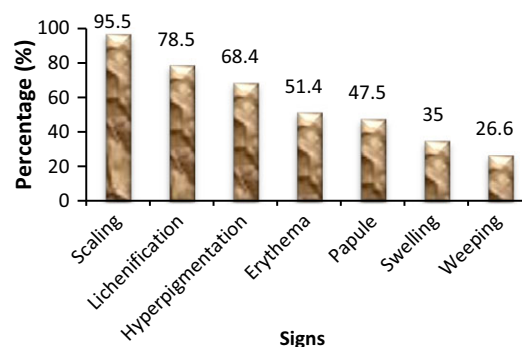
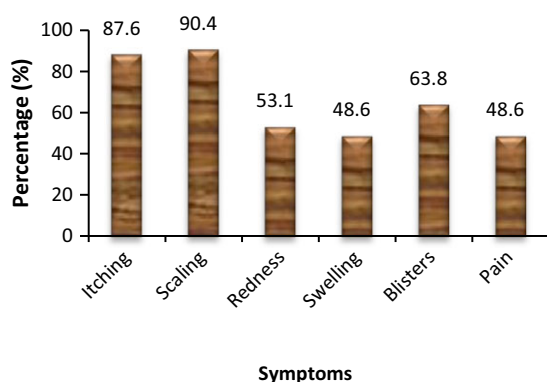


Figure 1 (a) Frequency of symptoms and signs (b) actual clinical signs

household products such as bleach and detergents in 90 (50.8%), and soap in 59 (33.3%) patients. Direct microscopy of skin scrapings in 20% potassium hydroxide (KOH) revealed fungal bodies in 53 (29.9%) patients.

A total of 53 (29.9%) had a personal or family history suggestive of atopy with more females (32: 18.1%) than males (21: 11.9%) although not statistically significant ($P > 0.05$). Thirty-five (19.8%) of the patients had symptoms and signs suggestive of atopy (recurrent itchy eyes, catarrh, sneezing, Dennie–Morgan folds, and the like), and 15 (8.5%) were asthmatic as diagnosed by a doctor. There were 129 (72.88%) patients exposed to irritants. Eighty-two (46.33%) had a negative patch response which was significant ($P < 0.017$), and 49 (27.7%) had positive patch responses. Of the 82 (46.3%) patients with irritant HD, 45 (25.42%) were atopic. The relationship between atopic dermatitis and exposure to irritants was significant with a P value of <0.019 .

There was a positive patch response in 65 (36.7%) of respondents, most of them positive to the implicated allergens, as displayed in Figure 2. There was no significant difference in positive patch response between males (29) and females (36) ($P > 0.05$). A strongly positive response (++) was noted to paraben mix, fragrance mix, para tertiary butylphenol formaldehyde resin (PTBP), and Balsam of Peru. Respondents had at least one (+) response to 20 of the 28 allergens, while there was no response to 8 of the allergens in the European series. Forty-six (70.8%) of positive patch respondents were sensitive to only one allergen, while 2 (3.1%) tested positive to 5 allergens. The most frequent cause of allergic hand dermatitis was paraphenylenediamine (PPD) followed by PTBP and dibromodicyanobutane, budesonide, and paraben mix. Figure 2 shows the patch responses with frequency of implicated allergens.

The relationship between the various etiologies of hand dermatitis is shown in Figure 3.

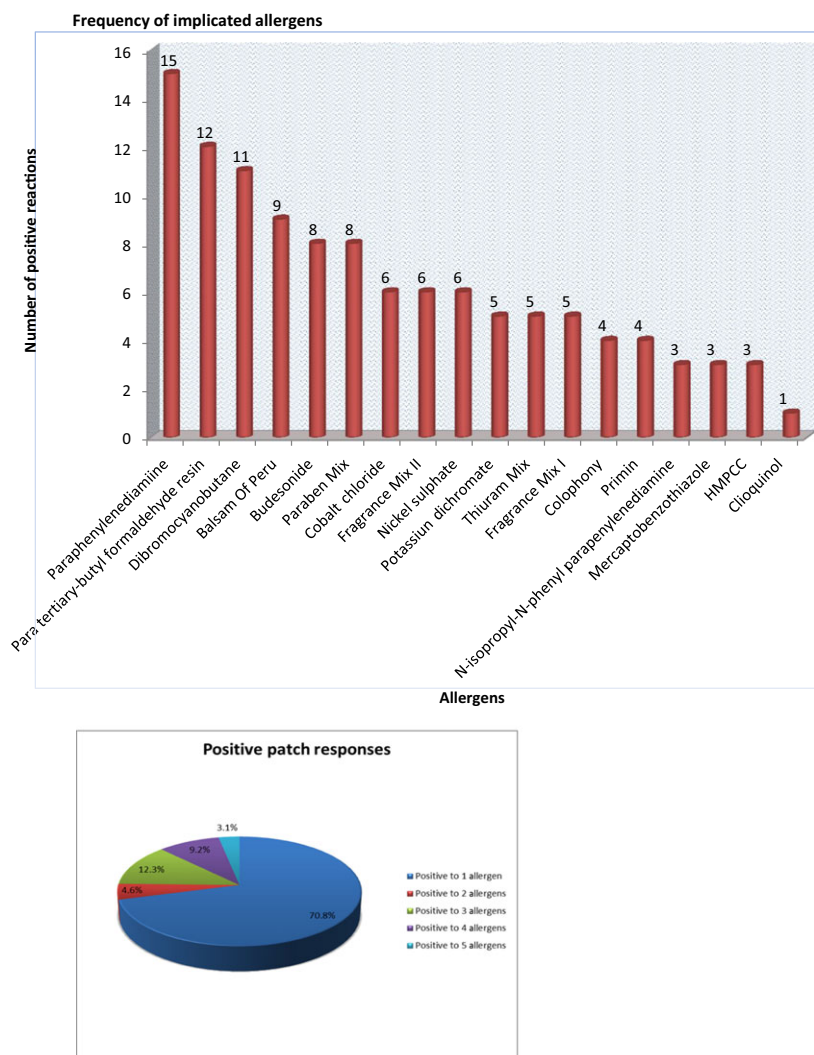


Figure 2 Main picture: Frequency of implicated allergens to the patch tests (inset). Pie chart: Displaying frequency of positive patch responses with chronic hand dermatitis

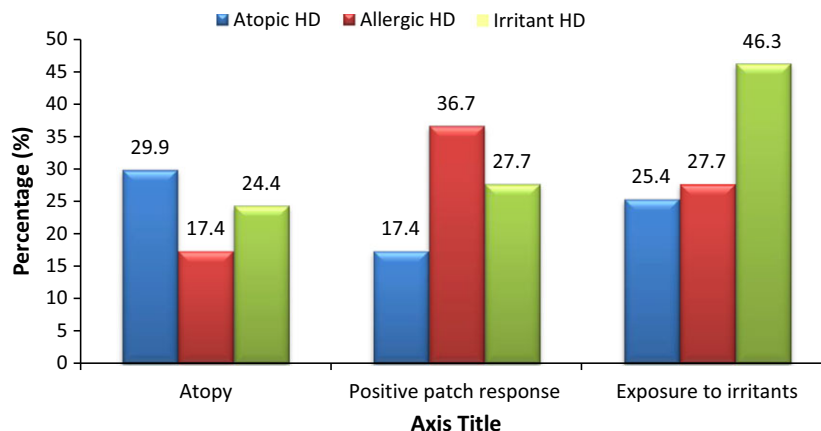


Figure 3 Relationship between the various etiologies of hand dermatitis

Discussion

Hand dermatitis is a common reason patients present to the skin clinic, with a frequency of more than 13% in this study. This high frequency may indicate chronicity. Factors that predispose to the development and persistence of HD in this environment include: poor knowledge of possible etiologies; use of irritants in the form of antiseptics, disinfectants, and herbs; poor knowledge of the need for and use of barrier gloves and creams; poor access to dermatology care; and the high humidity of the tropics.

The female preponderance and young age of patients concur with reports on contact dermatitis at the LUTH skin clinic.⁶ The slight female preponderance and a mean age of 34.6 ± 17.4 years is also comparable with figures from studies done on contact dermatitis in Africa and beyond.^{18–20} In this society, women remain the primary homemakers, childcare providers, housekeepers, and cooks irrespective of professional careers. They rarely make use of machines in these chores, exposing themselves to irritants and allergens both at the workplace and at home. Many studies quote higher female prevalence of contact dermatitis and theorize that early exposure to allergens or irritants by virtue of jewelry wearing and housework, care of small children, and cleaning duties are possible reasons.^{7,21,22} Bryld *et al.* concluded that the higher prevalence in women seems to be due to environmental rather than genetic factors.^{12,23}

The presence of HD in children less than 10 years in this study is not surprising as the African culture is to encourage them to participate in household chores at an early age.^{24,25} Three of the eight patients below 10 years had a history of atopy, two of whom had positive patch responses to nickel sulfate. The use of nickel in making cooking pots and pans may be responsible for this. A similar study in Ethiopia had only one patient being less than 10 years of age, who also had atopic dermatitis.¹⁸ While a conclusive statement cannot be made due to a small sample size of this age group, it may be supportive of the theory that prolonged or constant exposure to water allows for the development of dermatitis later in life.^{5,26} The

clinical features of hand dermatitis in this study are similar to those reported in literature with itching, scaling, and vesicles (blisters) rating high. Erythema was less seen than hyperpigmentation possibly because of its poor perception in the dark skin (Fitzpatrick skin type VI), which will not easily reveal the redness of inflammation.²⁷ Acute HD, typified by vesicles, weeping lesions, excoriations, and swelling, was seen in fewer patients than chronic HD with features of scaling, lichenification, and hyperpigmentation. Chronic HD is more common than acute HD worldwide for reasons stated above.⁵ Results from this study concur with others that the dorsum of the hands and the fingertips are the commonly affected areas in HD due to increased contact with allergens or irritants. These sites also harbor more bacteria which cause super infection and more inflammation.^{9,28} This study could not find any relationship between sites affected and cause of disease as the etiologies were interrelated. An attempt to correlate the distribution of lesions to the cause or type of HD has been unsuccessful in many studies as overlapping cases exist.^{29,30}

Irritant contact dermatitis was seen in almost half of patients, and this is statistically significant ($P < 0.017$) compared with ACD. This result agrees with studies worldwide, which report a higher prevalence of ICD than ACD in the etiology of HD.^{3,13} Irritants are very common in the environment, and water or wet work is most commonly implicated. It is important to state that most of the skin products, detergents, lotions, and dishwashing liquids that the patients used do not have all their ingredients stated; hence, the actual culprit may not be found. There was a significant association with atopy and irritant HD, giving credence to the fact that the atopic skin allows for increased penetration of irritants leading to worsening of AHD or ICD as reported by other investigators.^{13,29,30}

Fungal infection was documented in about a third of the patients in this series, and clearance of the infection gave some relief in 12.9% of the respondents. Fungal infections may be super infections or perpetuators of HD, as well as inciting agents of inflammation in atopic patients. They can also cause irritant dermatitis of their own accord.^{31,32}

The most frequently recurring allergens in descending order were PPD, PTBP, dibromodicyanobutane, budesonide, and paraben mix. Paraphenylenediamine is found in hair dyes, textiles, fur dyes, leather processing, rubber vulcanizing, printing, photography work, and x-ray fluids. There may be cross-reaction of PPD with other dyes like Azo and aniline dyes, procaine, benzocaine, PABA, and sulfonamides.^{14,33} An earlier study carried out in LUTH placed this allergen seventh in the culprit patch test series noting that the fashion trend of dyeing hairs was declining compared with the 1970s and 1980s.⁶ Recent reports have suggested that dyeing of hairs and tattooing which utilizes henna and some deep pigments is resurfacing. Adolescents and young adults are reported to develop ACD to PPD via hair dyes and tattoos.³⁴ There are reports of connubial allergic reaction in males who have never dyed their hairs or had a tattoo explaining occurrence of PPD allergy in male patients.^{35–37}

Nickel sulfate appears not to play a prominent role in the etiology of HD in this series as only 9.2% of subjects, who were all female students, had positive patch responses. This was not the finding in previous studies done in LUTH.^{6,38} The relevance of the positive response to nickel is not immediately obvious but may be from the common use of nickel plated or costume jeweleries, shoe, and belt buckles, which are rampant among young girls, especially students.²⁰ This study suggests reduction in the prevalence of nickel dermatitis over the years in Nigeria³⁸ as opposed to reports from other parts of the world where nickel sulfate is still the most frequently occurring allergen.^{19,33} A few studies have also reported a decrease in the prevalence of nickel allergy^{39,40} as a direct result of regulatory interventions in Germany and the Netherlands on the use of nickel in consumer products.

Balsam of Peru has been ranked high in the positive allergen response as seen in previous studies.³⁸ The use of self-prescribed medicaments and herbal concoctions (whose active ingredients are not known) probably not covered in the patch test series may contribute to disease recurrence, after initial clearance of symptoms. Herbal medicaments are commonly used across all social classes in the country. They comprise a mixture of different wood chippings or twigs, leaves, and spices, in either an alcohol or a water base, made into pastes, lotions, liquids that patients may apply topically or drink.^{41,42}

A positive response to primin, a plant allergen, was seen in four female patients, three of whom were caterers or cooks, and one housewife, similar to findings in a few other studies.⁴³ It had a low frequency in previous studies carried out at LUTH.^{6,38} It may be an allergen to watch due to the increasing awareness and practice of horticulture or gardening in households in Lagos. Ironically, its removal from the European series is presently being considered as there are declining positive reactions to it in the West.^{44,45} The response to treatment as outlined by the consensus statement on the management of hand eczema was an improvement in the severity of the dermatitis at the 6-week follow-up visit.⁷

Conclusion

Irritant hand dermatitis was more common than allergic, giving credence to a more prevalent exogenous cause of HD. The younger age group (<40 years) was more affected than the older group (>40 years) in the study population, and paraphenyldiamine is a significant cause of HD in our environment. There is a need for locally made patch tests with allergens that are not Eurocentric to improve diagnosis and identify more local culprit allergens. We, however, encourage repeated open application test (ROAT) to patients' products prior to the development of our local patch series.

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