

Current epidemiology of atopic dermatitis in south-eastern Nigeria

Edith N. Nnoruka, MB, BS, MSc. Clin. Derm. (Lond.), FMCP

From the Sub-Department of Dermatology,
Department of Medicine, College of Medicine,
University of Nigeria Teaching Hospital,
Enugu, Nigeria

Correspondence

E. N. Nnoruka, MB, BS, MSc. Clin. Derm. (Lond.),
FMCP
Sub-Department of Dermatology
College of Medicine
University of Nigeria Teaching Hospital
Enugu
Nigeria
E-mail: nkechi_nnoruka@yahoo.com

Abstract

Background Atopic dermatitis (AD) is a common pruritic, eczematous skin disorder that runs a chronic and relapsing course. In Nigeria, it is currently on the increase, particularly amongst infants, and has created cost burdens for families. It occurs in association with a personal or family history of asthma, allergic rhinitis and conjunctivitis. Major and minor criteria exist as guidelines for arriving at a diagnosis of AD, and surveys from Western countries have shown that these features, in particular the minor features, vary with ethnicity and genetic background and can be used to aid diagnosis. African dermatologists have also voiced concern that the much used Hanifin criteria for diagnosis of AD may need some adaptation for use in Africa.

Objective To document the features and disease outcomes of AD seen amongst dermatology hospital patients in Enugu, south-eastern Nigeria, with a view to reflecting current features amongst Nigerian Blacks.

Methods A prospective study of AD patients seen over a 2-year period at a tertiary referral dermatology clinic (University of Nigeria Teaching Hospital, Enugu, Nigeria) was carried out. A total of 1019 patients aged between 4 weeks and 57 years were included in the study.

Results The prevalence of AD was 8.5%, which is much higher than the prevalence of AD reported in various parts of Nigeria 15 years ago. AD occurred before the age of 10 years in 523 (51.3%) patients, whilst 250 (24.5%) had onset after 21 years. The earliest age of onset in infants was in the first 6 weeks of life, and this was found in 129 patients (12.7%). Education and occupation of household heads were the most significant ($P < 0.001$) factors associated with seeking proper health care for the child's AD. Four hundred and forty-one (43.3%) patients presented with subacute atopic eczema and 326 (32%) patients with severe impetiginized eczema. Four hundred and twenty-five patients (41.7%) had at least one first-degree family member with AD (16.7%), allergic rhinitis (10.3%), asthma (14.6%) and allergic conjunctivitis (2.1%), while 55 (13.3%) of controls had a positive family history ($P < 0.01$) of allergy. A personal history of AD only, without concomitant respiratory allergies, was seen in 486 (47.7%) patients. The face was affected in 431 (42.3%) patients. Inverse distribution of a flexural rash was observed over the extensor aspect of the joints: the elbow in 502 patients (49.3%), the wrist joint in 183 patients (17.9%) and the knee joints in 354 patients (34.7%). The commonly observed minor features included xerosis in 719 patients (71%), papular lichenoid lesions in 547 patients (54.1%), infraorbital folds in 498 patients (49.2%), palmar hyper linearity in 524 patients (51.8%) and raised peripheral blood eosinophils in 519 patients (51%), particularly for those with severe AD. Fissured heels, forehead lichenification, orbital darkening, nail pitting, sand paper-like skin lesions on the elbows/knees/lateral malleoli, knuckle dermatitis of the hands, palmar erythema and pitted keratolysis occurred more uncommonly as minor features. Infective complications were very common and included bacterial infections (folliculitis, impetiginized dermatitis and pyoderma) in 425 (41.7%) patients, fungal infections in 377 (37%) patients, parasitic infections (scabies) in 90 (8.8%) patients and viral infection (herpes simplex and molluscum contagiosum) in 29 (2.9%) patients. Thirteen of these atopics were also HIV positive. Aggravating factors most commonly reported included heat intolerance, excessive sweating, humidity, grass intolerance, thick woollen clothing and drug reactions. Only three patients had food intolerance. Three hundred and ten patients (30.4%) recalled their AD being worse in the hot humid periods and 383 (37.6%) could not recall any periods of relief or remission.

Conclusions The prevalence of AD amongst south-eastern Nigerian Blacks is on the increase, as in other areas, although it is still lower here than in other parts of the world. Many conventional minor features were found, but some occurred less frequently than in other countries, which may be attributed to ethnicity. Further studies will be required to confirm the ethnic differences in these features of AD amongst Nigerians and other Africans, to clarify the features of AD that are peculiar to Africans.

Introduction

Atopic dermatitis (AD) is a common pruritic inflammatory skin disorder that may present as acute, subacute or chronic eczema. AD is self-limiting, predominantly occurring in infants and children and punctuated by relapses and remissions. Its etiology is unknown but it has a polygenic mode of inheritance and is multifactorially determined,¹⁻³ particularly by environmental factors. It is associated with a personal or family history of atopy, barrier dysfunction, immune dysregulation and psychophysiological aspect.²⁻⁶ The prevalence of AD has been rising steadily over the years in Western countries, and current estimates suggest that 9–12% of children have AD, while the prevalence of atopic dermatitis in the general population is less than 10%.¹⁻³ In Africa and Nigeria, few studies have been carried out. Prevalences of 3, 3.5, 6.1 and even 17% have been recorded.^{7,8,10}

The pathogenesis of AD is still elusive, but its major diagnostic features include pruritus, typical morphology and distribution of rash, chronicity of rash and atopic personal or family history, while the most common minor criteria include generalized xerosis, ichthyosis, raised serum IgE, increased skin microbes, vasomotor instability, impaired cell mediated, itch on sweating, intolerance to food, wool and stress, conjunctivitis, facial pallor and pytriasis alba.

The criteria of Hanifin and Rajka¹⁻⁴ have been commonly applied; however, clinical studies on the diagnostic criteria of AD have produced different results, particularly in terms of the relative diagnostic significance of the major and minor features of AD.⁵ African dermatologists have also voiced concern that the much-used Hanifin criteria for diagnosis of AD may need to be adapted for use in Africa; recent studies from East Africa, in particular, have suggested this.^{11,12} One possible explanation for this discordance is that the features may be significantly dependent on ethnic and genetic background. Few studies on African Blacks addressing this question have been carried out. This study describes the clinical features and patient profiles of AD seen in Nigerian Blacks in a dermatology hospital. Demographic and socioeconomic factors were also examined, as these factors have been linked to the extent to which individuals are aware of health information concerning AD, which affects the course of AD either in the individuals themselves or in their children.

Materials and Methods

A prospective study was carried out on patients with AD seen at the skin clinic of the University of Nigeria Teaching Hospital (a tertiary referral skin center in Enugu, south-eastern Nigeria, located in an urban area that captures patients from all settings; rural through to urban) from February 1998 to March 2000. Dermatologic data were obtained from patients, patients' parents and relatives. Individuals with incomplete information were excluded from the study. A control group of 515 healthy adults and 211 healthy children was selected from individuals accompanying their relatives to the general medical outpatient department and Institute of Child Health in the same teaching hospital. These individuals had no skin diseases and were recruited simultaneously with AD patients.

The criteria for the diagnosis of AD were based on those of Hanifin and Rajka.⁴ The demographic data included age, sex, and the occupation and level of education of the individual or the head of the family, whilst the clinical data included personal and family history of atopy, presence of pruritus, morphology and distribution of rash, other symptoms of dermatitis, aggravating factors, and associated minor findings (such as xerosis, ichthyosis vulgaris and keratosis pilaris). Complications, laboratory findings and treatments were also recorded.

For the purposes of this study, a modified and simplified procedure was adopted for recording severity of AD in our patients, in accordance with Rajka and Langeland's study on the grading of severity of AD,⁹ because assessing the severity of AD is difficult, particularly when it involves recording skin signs such as erythema and atimes lichenification or crusting in tropical dark skin. In the Scoring Atopic Dermatitis (SCORAD) index studies performed in Bordeaux in France and in Belgium, pigmented skin was also found to be difficult to evaluate and was thus excluded from the analysis.¹³ Therefore, for each of our participants, the severity of the skin signs of AD (such as oozing/crusting, edema/papulation, erythema, excoriation and lichenification) was plotted on a body diagram (which covered almost all the body and represented sites of skin involvement). Consequently, results were recorded as mild (if there was < 20% involvement), moderate (20–50% involvement), severe (> 50–70% involvement) and erythrodermic when more than 90% of the body surface area was affected in addition to an underlying erythema. Recording of itching (disturbed night's sleep) was on a subjective basis. This was assessed by the

patients or the parents of children with AD, using a 10-cm visual scale, on which 0 = not present and 10 cm = extremely severe.

Results

A total of 12 013 patients with skin diseases were seen at the skin clinic of the University of Nigeria Teaching Hospital, Enugu, Nigeria from February 1998 to March 2000. Of these patients, 1019 patients with AD met the criteria for this study, thus giving a prevalence of 8.5%. The age range was from 1 month to 59 years, with an average of 13.8 years (Table 1). Females were more affected than males, with 611 (59.9%) females and 408 (40%) males. All patients seen were tropical Blacks. There were no racial differences amongst our patients; however there were some ethnic differences.

Table 2 shows the age of onset of AD in Nigerian infants in this study; 129 (12.7%) infants developed symptoms of atopy within 6 weeks of life and 523 (51.3%) children developed AD before the age of 10 years. A significant number (261; 25.6%) developed AD in their teens or in early adult life, and 103 (10.1%) developed AD for the first time after 31 years of age.

Four hundred and twenty-five (41.7%) patients had at least one first-degree family member with atopy; amongst these, 139 (32.7%) males showed a significant proportion with a positive family history of atopy than females 102 (24%); while 68 (9.4%) of controls had a positive family

history ($P < 0.01$) of respiratory allergies. No family history of atopy was recorded in 576 patients (56.5%). Four hundred and eighty-six patients (47.7%) had a personal history of AD alone, while 363 patients (35.6%) had a concomitant history of respiratory allergies (Table 3). The clinical severity of AD observed in our patients at initial presentation was mainly severe AD, which was recorded in 326 patients (32%), while 235 patients (23.1%) had mild AD. Subacute eczema was observed in 441 (43.3%) patients, while 16 (1.6%) had erythrodermic AD.

Table 4 shows the distribution pattern of the rash with respect to the flexures (joints) observed amongst our AD patients. Overall, the extensors of the joints were most affected, with rash being found here in 716 (70.3%) AD patients, while 528 patients (51.8%) had rash in the antecubital fossa and 502 (49.3%) on the extensor surface of the elbow joints. The age group 0–3 years often showed more of an extensor pattern, while in the age group > 3–18 years the flexural pattern predominated. Nevertheless, reliance on distribution pattern for diagnosis may fail to identify a substantial cohort in Africa. The rash was more of a scattered micropapular, annular form localized to hair follicles on the extensors with hyperpigmentation and lichenification. Thirty-six patients (3.5%) had perioral distribution; these were mainly children, whilst the older patients exhibited eczema on their hands and feet. This was observed in 204 (20.1%) patients, and 76 (7.5%) females had

Table 1 Age distribution of patients with AD and the control group

Age group (years)	Atopic dermatitis (n = 1019)	Control group (n = 726)
0–3	290	107
4–10	269	209
11–20	215	193
21–30	142	125
≥ 31	103	92

Table 2 Atopic dermatitis amongst infants of south-eastern Nigeria

Age of onset (weeks)	No. of patients
1–6	129 (12.7%)
7–12	83 (8.1%)
13–18	58 (5.7%)
19–24	49 (4.8%)
25–30	31 (3.0%)
31–36	37 (3.6%)
37–42	28 (2.7%)
≥ 43	13 (1.3%)

Table 3 Frequency of “pure AD” and respiratory/mucosal allergies

Personal history	AD patients	Control group
Atopic dermatitis (only)	486 (47.7%)	–
Asthma	117 (11.5%)	17 (2.3%)
Conjunctivitis	13 (1.3%)	5 (0.7%)
Allergic rhinitis	42 (4.1%)	29 (3.9%)
Concomitant respiratory allergies	363 (35.6%)	21 (2.9%)

Table 4 Relationship of age to flexural involvement in AD patients of south-eastern Nigeria

AD patients	
	0–3 years (n = 298)
Extensors	
Wrists	78 (27.2%)
Elbows	111 (38.5%)
Knees	108 (37.4%)
Flexures	
Wrists	48 (16.7%)
Elbows	115 (40.1%)
Knees	51 (17.9%)
	> 3–18 years (n = 373)
Extensors	
Wrists	31 (8.3%)
Elbows	64 (17.1%)
Knees	58 (15.6%)
Flexures	
Wrists	42 (11.3%)
Elbows	211 (56.8%)
Knees	170 (45.7%)

Table 5 Frequency of associated minor criteria observed in AD patients compared to controls

Skin condition (minor features)	AD patients (n = 1012)	Controls (n = 726)
Xerosis	719 (71%)	31 (4.3%)
Periorbital darkening	550 (54.3%)	0
Papular lichenoid lesions	547 (54.1%)	15 (2.1%)
Palmar hyperlinearity	524 (51.8%)	6 (0.8%)
Infraorbital folds	498 (49.2%)	9 (1.3%)
Itch on sweating	398 (39.3%)	12 (1.7%)
Ichthyosis	217 (21.4%)	0
Hand and foot eczema	204 (20.1%)	0
Shiny nails	204 (20.0%)	0
Keratitis pilaris	171 (16.7%)	0
Pytiriasis alba	134 (13.1%)	0
Forehead lichenification	109 (10.7%)	0
Palmar erythema	87 (8.5%)	0
Retro/infra-auricular intertrigo	86 (8.4%)	0
Nipple eczema	76 (7.5%)	0
White dermographism	75 (7.4%)	0
Fissured heels	53 (5.2%)	5 (0.7%)
Nail pitting	44 (4.3%)	0
Cheilitis	41 (4.0%)	0
Knuckle dermatitis	39 (3.8%)	0
Pitted keratolysis	19 (1.7%)	0

nipple eczema. Facial involvement was more marked in children than adults ($P < 0.001$), and infants with associated itchy scalp were the most affected.

Table 5 shows the associated minor criteria observed in our patients with AD. The most frequent condition was xerosis (present in 71% of patients), which was significantly more common in patients than in controls (71% > 4.3%; $P < 0.005$). Other minor features more common in the AD group than in the controls (as shown in Table 5) included papular lichenoid lesions (54% vs. 2.1%; $P < 0.001$), infraorbital folds (49.2% vs. 1.3%; $P < 0.0001$), palmar hyperlinearity (51.8% vs. 0.8%; $P < 0.001$), and ichthyosis (21.4% vs. 0%; $P < 0.000$). Less frequent minor features included forehead lichenification (10.7%), fissured heels (5.2%), palmar erythema (8.5%), nail pitting (4.3%), knuckle dermatitis (3.8%) and pitted keratolysis (1.7%). None of these was found in the controls (Table 5). Alopecia areata was found in association with AD in 17 (1.7%) patients and napkin rash occurred in 127 (12.5%) infants. Infections or infestations that occurred in these patients included bacterial infections (folliculitis, pyoderma and impetiginized excema), found in 425 patients (41.7%), fungal infections, found in 377 patients (37%), scabies, found in 90 patients (8.8%), and viral infections, found in 29 patients (2.9%). The common environmental triggers that were observed to reactivate AD in our patients were humidity (heat and perspiration) in 390 (38.3%), grass intolerance in 56 (5.5%), drug allergy in 40 (3.9%) and stress in 13 (1.3%);

and food allergies, particularly to eggs, crayfish and artificial milk, in 36 (3.5%). Three hundred and ten patients (30.4%) recalled that their eczema was worse in the harmattan (dry season) and 69 (6.8%) that it was worse in the rainy season, while 383 (37.6%) could not recall any exacerbating factors.

Laboratory tests included a full blood count, which was performed on all our patients. Eosinophil count was elevated in 51.4% (524) of our patients. Serum IgE levels were only measured in some individuals [47 patients (4.6%) and 29 controls (4.0%)] as the facilities for this were not readily available. IgE levels were found to be significantly higher in AD patients than in controls ($P < 0.001$). A stool analysis was performed for 100 patients with AD; of these, only 19 (1.9%) had helminthes as against 23 (3.1%) of the controls. Serological tests (enzyme-linked immunosorbent assay; ELISA) and western blots were carried out, respectively, for screening and confirming HIV/AIDs. These tests were performed on 67 AD patients, 13 (1.3%) of whom were confirmed to be HIV positive.

With regard to demographics, 598 family heads (58.7%) were educated and 163 (15.9%) were unemployed. Education and employment status of household heads were positively associated with seeking of proper health care for families that included individuals with AD ($P < 0.0001$). Thus environmental factors may be important in determining the expression of the disease.

Our patients were treated with emollients (dispersible emollients such as aqueous creams, emulsifying ointments or white soft paraffin); coal tar and salicylic acid; mild to moderate strength corticosteroid creams; antihistamines, and mast cell stabilizing agents like ketotifen. Systemic antimicrobials were prescribed in 266 patients (53.7%) and topical antimicrobials (mupiricin, fuscidin and tetracycline) in 114 (23%). Systemic antifungals (itraconazole, terbinafine, fluconazole and griseofulvin) were prescribed in 133 patients (26.7%). For those with severe extensive AD, the following were used: short courses of systemic steroids in 31 patients (3.1%), PUVA in 11 patients (1.1%) and cyclosporine in six patients (0.6%).

Discussion

Atopic dermatitis (AD), also known as atopic eczema or Besniers prurigo, has been defined as an eczematous eruption that is pruritic, recurrent, often flexural, symmetrical and associated with IgE-mediated diseases such as asthma, allergic rhinitis and conjunctivitis. It is associated with a family history or a personal history of atopy.

Four hundred and twenty-five patients (41.7%) had at least one first-degree family member with atopy; 47.7% had a personal history of AD alone, and 35.6% had a concomitant history of respiratory allergies in which asthma was most frequently associated with AD. Olumide⁷ and George,⁸ in studies

carried out in western Nigeria, recorded positive histories of atopic diathesis in the families of those with AD, with only 5% having other symptoms of atopy, notably asthma and vernal conjunctivitis. Our findings are also similar to those of Tay *et al.*¹⁴ and Diepden and Fartash,¹⁶ whose studies revealed that 47% of their patients had at least one first-degree family member with atopy,¹⁴ while 54% had pure AD (i.e. had no personal or family history of respiratory allergies), and 46% had a mixed type with concomitant respiratory allergies.¹⁶ They observed allergic rhinitis as being most commonly associated with AD.^{4,16} Respiratory involvement was also significant amongst those with a family history of atopy.

More females were affected than males, in a ratio of 1.6 : 1. This is in accordance with earlier studies carried out by Olumide⁷ in Nigeria as well as by Larson¹⁵ and Diepegen,¹⁶ whose studies were based on Caucasians. The prevalence of AD in this study was 8.5%. This figure is much higher than the prevalence of AD reported in western Nigeria about 15 years ago, in 1986 and 1989 by Olumide⁷ and George,⁸ respectively. This can probably be explained by the rapid urbanization and changes in lifestyle experienced by the average Nigerian family. More families with educated, salaried or self-employed family heads now have the means to address their children's medical problems. Nevertheless, this value is still lower than the values reported in the Western literature, which are usually between 10 and 16%.^{17,19} It is thought that the actual prevalence is higher in the community, as many cases of AD, especially the milder cases, present initially to general practitioners. This report was based on hospital outpatient data and, interestingly, the prevalence obtained is also higher than those found in similar studies in Malaysia and Singapore which were also hospital outpatient based, with prevalences of 2.14 and 3.7%,¹⁸ respectively. Furthermore, for the International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee Report on 463 801 children aged 13–14 years from 56 countries in 1996, Onadeko¹⁰ provided data for Nigeria (Ibadan, western Nigeria). These 12-month prevalences of AD symptoms showed Nigeria topping the list with 17%. However, this was a questionnaire study of school-based children aged between 13 and 14 years old and included questions based on the presence of flexural itchy rash. Questionnaires that ask questions based on an American or European view of the diagnostic features of AD may not be suitable for Africa. The ISAAC study¹⁰ also shows that, where different regions of the same country are studied, as in Kenya, widely differing prevalence may be found. This may also be the case for Nigeria, as it is a huge country.

We found that an extensor distribution of eczema was common in our patients. In 70.3% of patients, the extensor aspects of the joints were most affected, with a rather more scattered micropapular rash, often localized to hair follicles

and occasionally annular. This distribution and pattern of perifollicular rash are commonly observed in Black patients.²⁴

Patients with AD have a strong tendency to ichthyosis vulgaris, keratosis pilaris, chelitis and pityriasis alba.^{5,20} The frequency of ichthyosis vulgaris in AD ranges from 1.6 to 37%^{5,20} and has been found to be higher in dark-skinned people. Ichthyosis vulgaris, hyper linear palms and keratosis pilaris have also been found to vary according to ethnic group.^{20,24} Of our patients, 21.4% had associated ichthyosis vulgaris and its frequency increased with age. Seventy-one per cent had xerosis and 51.8% had palmar hyper-linearity. These conventional minor features observed showed some agreement with previous results. Other minor criteria observed in our AD patients included papular lichenoid lesions, found in 54.1% of patients; this was a more common feature in those with subacute and chronic eczema. Retro-auricular and infra-auricular intertrigo occurred mostly in 8.4% of children, while infraorbital folds were seen in 45.6% and pityriasis alba in 13.1%. Some other cutaneous features were observed less frequently; further work in communities would be useful to determine their frequencies as they might have been overlooked in the past. These less common features included fissured heels (5.2%; fissuring of the heels is a common feature amongst farmers and inhabitants of rural farming settings, and must be differentiated from that found in AD patients by history and examination of patients), forehead lichenification (10.7%), sand paper-like hyperpigmented skin (42.7%), nail pitting, knuckle dermatitis and palmar erythema. These were seen mostly in our adolescent and elderly AD patients.

AD patients are particularly prone to infections such as bacterial, viral and occasionally fungal infections.^{13,23} These can lead to flare-ups of eczema. *Staphylococcus aureus* colonizes the skin of well over 90% of atopics.^{21,22} In this series, 41.7% of patients presented with secondary bacterial infection, whilst 37% had secondary fungal infection. This was related to the very high humidity and moisture levels. *Trichophyton rubrum* or *Trichophyton soudanense* was cultured from our atopics with flare-ups and those with severe AD. These presented commonly as either tinea corporis or tinea incognito. Mycological studies helped to confirm these fungal infections. The next most common infections were viral infections such as herpes simplex, viral warts and molluscum contagiosum. These accounted for only 2.9% of the infective complications. Interestingly, helminthic infection amongst our atopics was also low when compared to the general population. The overall prevalence rate of intestinal helminths is 17.74%²⁵ in Enugu and the helminthes commonly identified are *Ascaris lumbricoides*, hookworm, *Strongyloides stercoralis* and *Trichuris trichiura*.²⁵

Management of our patients consisted of the use of emollients (particularly dispersible emollients such as aqueous creams, or alternatively emulsifying ointments or equal parts of liquid paraffin/white soft paraffin) and mild to moderate

strength topical steroids. Coal tar with salicylic acid was particularly effective for our AD patients with chronic lichenified lesions. Antihistamine and mast cell stabilizing agents were used, and these were quite effective in children. Systemic antimicrobials were prescribed in 53.7% of patients. These were effective in the majority of patients with bacterial infections and weeping, crusting lesions. Short courses of oral corticosteroids were occasionally used in severe flare-ups of itch crises. The majority of our patients were advised to use soap substitutes such as aqueous creams for bathing, but most of them could not avoid the use of soaps, nor were they happy to use the soap substitutes due to the very hot, humid climate and excessive sweating. Olumide⁷ obtained similar findings. For the management of AD patients in our environment, low socioeconomic status and poor health care-seeking behavior create a challenge.

In conclusion, the prevalence of AD in Nigeria is similar to, although slightly lower than, that reported in Western countries. The frequency of constitutional presentation in the Nigerian population was significantly lower than that found in Caucasian populations, and many of the conventional minor features were expressed. However, some minor cutaneous features occurred less frequently in the Nigerian population than in Caucasian populations, and this may be attributable to differences in ethnic background. Further studies will be required to confirm the ethnic differences in these features of AD amongst Nigerians and other Africans as a region, to clarify the features of AD that are peculiar to Africans.

Acknowledgments

The author is very grateful to the entire staff of the skin clinic of the University of Nigeria Teaching Hospital, who provided all manner of assistance during the course of the study, in particular the records clerks. Special thanks are also due to Dr S. M. O. Nnoruka for all his constructive criticism.

References

- Cooper KD. Atopic dermatitis: recent trends in pathogenesis and therapy. *J Invest Dermatol* 1994; 102: 128-137.
- Larsen FS, Hanifin JM. Secular changes in the occurrence of atopic dermatitis. *Acta Dermatol Venereol (Stockh) Suppl* 1992; 176: 7-12.
- Dotterud LK, Kammen B, Lund E, *et al.* Prevalence and some clinical aspects of atopic dermatitis in SorVaranger. *Acta Dermatol Venereol (Stockh)* 1995; 75: 50-53.
- Hanifin JM, Rajka G. Diagnostic features of atopic dermatitis. *Acta Dermatol Venereol (Stockh) Suppl* 1980; 92: 44-47.
- Rajka G. *Essential Aspects of Atopic Dermatitis*. Berlin: Springer-Verlag, 1989.
- Uehara M, Kimura C. Descendant family history of atopic dermatitis. *Acta Dermatol Venereol (Stockh)* 1993; 73: 62-63.
- Olumide YM. The incidence of atopic dermatitis in Nigeria. *Int J Dermatol* 1986; 26: 367.
- George AO. Atopic dermatitis in Nigeria. *Int J Dermatol* 1989; 28: 237-239.
- Rajka G, Langeland T. Grading of the severity of atopic dermatitis. *Acta Dermatol Venereol (Stockh) Suppl* 1989; 144: 13-14.
- The International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee. Worldwide variation in prevalence of symptoms of asthma, allergic rhinoconjunctivitis, and atopic eczema: International Study of Asthma and Allergies in Childhood (ISAAC) Steering Committee. *Lancet* 1998; 351: 1225-1232.
- Gibbs S. Skin diseases and socio-economic conditions in rural Africa: Tanzania. *Int J Dermatol* 1996; 35: 633-639.
- Masenga J. Atopic dermatitis: a clinical and epidemiological study in a village in the Kilimangero region of Tanzania. PhD thesis. University of Bergen: Bergen, 1997.
- Oranje AP, Stalder JF, Taieb A, *et al.* Scoring of atopic dermatitis by SCORAD using a training atlas by investigators from different disciplines. *Pediatr Allergy Immunol* 1997; 8: 28-34.
- Tay Y-K, Khoo B-P, Goh C-L. The profile of atopic dermatitis in a tertiary dermatology outpatient clinic in Singapore. *Int J Dermatol* 1999; 38: 689-692.
- Larson PA, Liden S. Prevalence of skin disease amongst adolescents 12-16 years of age. *Acta Dermatol Venereol (Stockh)* 1980; 60 (5): 415-423.
- Diepgen TL, Fartash M. Recent epidemiology and genetic studies in atopic dermatitis. *Acta Dermatol Venereol (Stockh) Suppl* 1992; 176: 13-18.
- Berth-Jones J, George S, Graham-Brown RAC. Predictors of atopic dermatitis in Leicester children. *Br J Dermatol* 1997; 136: 498-501.
- Jaafar RB, Pettit JHS. Atopic eczema in a multiracial country (Malaysia). *Clin Exp Dermatol* 1993; 18: 469-499.
- William HC, Strachan DP, Hay RJ. Childhood eczema: disease of the advantaged. *Br Med J* 1994; 308: 32-1135.
- Uehara M, Hayashi S. Hyperlinear palms. Association with ichthyosis and atopic dermatitis. *Arch Dermatol* 1981; 117: 490-491.
- Leyden JJ, Marples RR, Kligman AM. Staphylococcus aureus in the lesions of atopic dermatitis. *Br J Dermatol* 1974; 90: 525-530.
- Goh CL, Wong JS, Giam YC. Skin colonization of staphylococcal aureus in atopic dermatitis patients seen at the national skin center. *Singapore Int J Dermatol* 1997; 36: 653-657.
- Hanifin JM. Atopic dermatitis. In: Moschella SL, Hurley HJ, eds. *Dermatology*. Philadelphia: WB Saunders, 1992; 441-464.
- Wells RS. Some genetic aspects of dermatology: a review. *Clin Exp Dermatol* 1980; 5: 1-11.
- Nwokediuko SC, Ozumba UC. Intestinal helminths in relation to chronic diarrhoea in human immunodeficiency virus-seropositive adults in Enugu. *Niger Postgrad Med J* 2002; 9: 88-91.