

# The Epidemiology of Atopic Dermatitis at a Tertiary Referral Skin Center in Singapore

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Atopic dermatitis is a common inflammatory skin disease occurring primarily in infants and children and characterized by acute, subacute and chronic lesions. In the acute phase, the affected areas present as erythematous papules and vesicles that become excoriated, exudative and secondarily infected. In the subacute phase, there are excoriations and erythematous scaling papules and plaques present. Chronic eczema is characterized by changes secondary to repeated rubbing and scratching resulting in lichenification.

The prevalence of atopic dermatitis appears to be increasing over the past 3 decades in Western countries and current estimates suggest that 9% to 12% of children will suffer from atopic dermatitis.<sup>1</sup> Most of the studies on the epidemiology of atopic dermatitis are based on the Western population and there is little data in the Asian population. The purpose of our study is to describe the clinical pattern and patient profile of atopic

**SUMMARY** Atopic dermatitis is a common chronic, relapsing, pruritic ecematous skin condition with a predilection for the flexural areas and occurs in patients with a personal or family history of atopy. The aim of this study is to describe the profile of atopic dermatitis seen at the National Skin Centre in Singapore. A retrospective chart review was conducted of all the patients with atopic dermatitis seen during the first six months of 1994. There were 492 patients whose ages ranged from one month to 74 years with an equal sex ratio. The prevalence was 2%. The onset of the disease occurred before the age of 10 years in 61.2% of patients. In 13.6% of the patients, the onset was after the age of 21 years. Two hundred and fifty-four patients (52%) had "pure" atopic dermatitis without concomitant respiratory allergies. Two hundred and thirty-eight patients (48%) suffered from a "mixed" type, with 23% having allergic rhinitis, 12% having asthma and 13% having both asthma and allergic rhinitis. Two hundred and thirty-one patients (47%) had at least one first-degree family member with atopy: atopic dermatitis (17%), asthma (15%) and allergic rhinitis (15%). Most of the patients, 416 (84.5%), had subacute eczema at presentation. Ichthyosis vulgaris was present in 38 patients (8%) and pityriasis alba in 13 patients (3%). The most common infective complication was bacterial infection (impetiginized eczema, folliculitis, cellulitis) present in 95 patients (19%) followed by viral infections (eczema herpeticum, viral warts and molluscum contagiosum) in 17 patients (3%). Allergies were noted in 43 patients (9%) based on the history given. The most common was drug allergies (penicillin and co-trimoxazole) in 28 patients followed by food allergies in 11 patients. Common aggravating factors reported include heat, sweating, stress, thick clothing and grass intolerance. Most patients could be controlled with a fairly simple regimen of moisturizers, topical steroids and antibiotics for acute flares. Short courses of systemic steroids were used in 78 patients (16%). Three patients were treated with phototherapy, Two on UVAB and one on PUVA. The pattern of atopic dermatitis in Singapore is similar to that reported in the Western literature except for a lower prevalence and a significant proportion of adult onset atopic dermatitis.

dermatitis seen in a tropical multi-racial country.

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## MATERIALS AND METHODS

This is a retrospective study of patients with atopic dermatitis who were seen at the National Skin Center, a tertiary referral skin center between January 1994 and June 1994. The criteria for the diagnosis of atopic dermatitis were based on those of Hanifin and Rajka.<sup>2</sup>

Dermographic data were collated from patients' case records. The following information were specifically looked for: personal and family history of atopy, aggravating factors, morphology of the eczema, associated findings like ichthyosis vulgaris, complications, laboratory findings, treatment and outcome. Any information that was missing was obtained where possible from the patients when they came back for follow-up.

## RESULTS

A total of 492 patients with atopic dermatitis were identified. During this period, 24,530 patients with skin diseases attended the National Skin Center, giving a prevalence of 2%. The sex ratio was approximately equal, 250 males and 242 females. 82.8% were Chinese, 7.9% Malays, 5.1% Indians and 4.2% others. This was comparable to the racial composition of the general dermatological patients attending the Center during this time (79.5% Chinese, 7% Malays, 7.6% Indians and 5.9% others). The age range was one month to 74 years with an average of 13.4 years.

Table 1 shows the age of onset of the disease in our study cohort. The majority of the patients developed symptoms of atopic dermatitis in the first 10 years of life

**Table 1** Age at onset of the disease

Age group (years)	Number of patients (%)
0 - 2	146 (29.7)
3 - 10	155 (31.5)
11 - 20	66 (13.4)
21 - 30	37 (7.5)
> 31	30 (6.1)
<b>Total</b>	<b>434*</b>

\*58 case notes were not available for analysis

**Table 2** Rates of "pure" atopic dermatitis and concomitant allergic rhinitis and asthma

Personal history	Number of patients (%)
"Pure" atopic dermatitis	254 (52)
Concomitant respiratory allergies	238 (48)
• Allergic rhinitis	112 (23)
• Asthma	58 (12)
• Asthma and allergic rhinitis	68 (13)

(61.2%). However, in a significant proportion, atopic dermatitis first developed during the teenage and early adult years (20.9%) and in 6.1% it first developed after the age of 31 years.

Table 2 shows the frequency of "pure" and concomitant atopic diseases. Two hundred and fifty-four patients (52%) had "pure" atopic dermatitis and 238 (48%) suffered from a "mixed" type with concomitant respiratory allergies. One hundred and twelve (23%) had allergic rhinitis, 58 (12%) had asthma and 68 (13%) had asthma and allergic rhinitis.

Table 3 shows the frequencies of a family history of atopy. Two hundred and thirty-one patients (47%) had at least one first-

degree family member with atopy: atopic dermatitis, 85 (17%), asthma 73 (15%) and allergic rhinitis, 73 (15%). In 261 patients (53%), there was no family history of atopy.

The majority of our patients 416 (84.5%) had subacute eczema at presentation 19 (3.9%) had acute eczema and 57 (11.6%) chronic eczema. Acute eczema refers to vesicle formation with oozing and crusting, chronic eczema to epidermal thickening with lichenification and an intermediate form called subacute eczema with both vesiculation and epidermal thickening present. Table 4 shows the associated skin conditions in our patients with atopic dermatitis. The most frequent condition was ichthyosis vulgaris, 38 patients

**Table 3** Frequencies of a family history of atopy

Family history	Number of patients (%)
Atopic dermatitis	85 (17)
Asthma	73 (15)
Allergic rhinitis	73 (15)
Total	231 (47)
No family history of atopy	261 (53)

**Table 4** Associated skin conditions

Skin conditions	Number of patients
Ichthyosis vulgaris (IV)	34
Pityriasis alba (PA)	11
Keratosis pilaris (KP)	4
IV + KP	2
IV + PA	2
Lichen amyloid	1
Alopecia areata	1
Total	55

**Table 5** Infective complications

Complication	Number of patients
Impetiginized eczema	87
Folliculitis	6
Cellulitis	2
Eczema herpeticum	7
Viral warts	6
Molluscum contagiosum	4
Scabies	2
Tinea infection	2
Total	116

(8%) followed by pityriasis alba, 13 patients (3%). Six patients had keratosis pilaris and one each had lichen amyloid and alopecia areata.

Table 5 shows the frequencies of the various infective complications that occurred in our patients during follow-up. The most

common complication was bacterial infection, 95 patients (19%) followed by viral infections, 17 patients (3%).

Allergies were noted in 43 patients (9%). The most common was drug allergies, 28 patients followed by food allergies, seafood and eggs in 11 patients. This was based on the history given by the patient. The most common drug allergy was penicillin followed by co-trimoxazole. Two patients had positive patch tests to nickel and one to colophony. Complete blood counts were done in 8 patients and in 3, elevated eosinophil counts were noted. Serum immunoglobulin E (IgE) levels were done in 8 patients and in 7, levels were elevated. Commonly reported aggravating factors for the dermatitis include heat, sweating, stress, thick clothing and grass intolerance.

All our patients were treated with moisturizers (urea cream, emulsifying ointment, aqueous cream) and mild to moderate strength topical steroids (hydrocortisone, betamethasone and fluocinolone). Topical antibiotics were prescribed in 38 patients of which tetracycline ointment was the most common, 24 patients, followed by mupirocin, 11 patients and fucidin, 3 patients. Coal tar was used in 5 patients.

Systemic antibiotics were prescribed in 194 patients (39%). The most common was cloxacillin followed by erythromycin. Short courses of systemic steroids were used in 78 patients (16%) to control acute flares. Three patients were put on phototherapy, 2 on combined UVA and UVB (UVAB) and one on oral psoralen photochemotherapy (PUVA) to control severe, extensive dermatitis. The

duration of follow up ranged from one month to 11 years with a mean of 1.5 years. One hundred and seventy-eight patients (36%) were still on follow-up one year from diagnosis.

## DISCUSSION

Atopic dermatitis is generally a disease of infancy and childhood with 80%-90% of cases occurring before the age of 7 years.<sup>3</sup> We had similar findings in that the majority of our patients (61.2%) had onset before the age of 10 years. Adult onset, after the age of 21 years is said to be uncommon constituting only about 2.4% of cases.<sup>3</sup> In our series, a significant proportion of patients 13.6% had a later onset after the age of 21 years. Our findings were similar to another study carried out in Malaysia, an Asian country, where 13% of the patients had onset of atopic dermatitis after the age of 21 years.<sup>4</sup>

The sex ratio was approximately equal. This is in accord with some studies,<sup>4,5</sup> although other studies showed more females affected in a ratio of 1.7 to 2:1.<sup>6,7</sup> There were no ethnic differences among our patients with atopic dermatitis compared to the general dermatological patients. Similar findings were obtained in Jaafar and Pettit's study where the authors' found no difference in the prevalence of atopic dermatitis among the various racial subgroups.<sup>4</sup>

The prevalence of atopic dermatitis in our study was 2%. This figure was rather low compared to that reported in the Western literature, between 11% to 16%.<sup>5,8</sup> Our study was based on hospital outpatient data and it is

conceivable that the actual prevalence would be higher in the community as many cases of atopic dermatitis, especially the milder ones would have been self treated or treated by the general practitioners (GPs) and not seen by us. It is interesting however, that a similar study in Malaysia based on hospital outpatient data showed a similar low prevalence of atopic dermatitis of 3.7%.<sup>4</sup>

Fifty two percent of our patients had "pure" atopic dermatitis and 48% had a "mixed" type with concomitant respiratory allergies. Similar findings were obtained in Diepgen and Fartasch's study where 54% had "pure" atopic dermatitis and 46% suffered from a "mixed" type.<sup>7</sup> Allergic rhinitis appears to be more commonly associated with atopic dermatitis than asthma.<sup>3,7,9</sup> We had similar findings where allergic rhinitis appears to be twice as common compared to asthma. Forty seven percent of the patients had at least one first-degree family member with atopy. The proportion of atopic dermatitis, asthma and allergic rhinitis in the family members were approximately equal. In Larsen's study, 59% of the subjects had a family history of atopy and the proportion of family members with eczema and allergic rhinitis were equal and twice that of asthma.<sup>5</sup>

Ichthyosis vulgaris, keratosis pilaris and pityriasis alba are associated with atopic dermatitis. The frequency of ichthyosis vulgaris in atopic dermatitis has ranged from a low of 1.6% to 37%.<sup>3,10</sup> Eight percent of our patients had associated ichthyosis vulgaris. Both bacterial and viral skin infections are common in patients with atopic dermatitis. *Staphylococcus aureus* colonizes

the skin in 90% of patients with atopic dermatitis.<sup>11</sup> Furthermore, the more severe the dermatitis, the higher the rate of colonization (100%).<sup>12</sup> Not only does this secondary bacterial infection produce weeping or crusted impetiginized plaques and pustules, it also causes acute flares of the dermatitis. Nineteen percent of the patients had at least one episode of bacterial infection. There is usually an excellent clinical response to antistaphylococcal antibiotics like cloxacillin, cephalixin and erythromycin. Antibiotics, either systemic or topical were prescribed in 47% of the patients. Most of the patients were on cloxacillin or erythromycin and a smaller number on cephalixin and cotrimoxazole. A recent study from the same center showed that all the *S. aureus* isolates were sensitive to cloxacillin, cephalixin and cotrimoxazole and 92% were sensitive to erythromycin.<sup>12</sup> This resistance of *S. aureus* to erythromycin (8%) requires close monitoring and may require a change in antibiotic prescription in the future. Although viral infections like eczema herpeticum, viral warts and molluscum contagiosum occur more frequently in atopic dermatitis, these were uncommon in our study, occurring in 3% of the patients.

Although the use of systemic corticosteroids is discouraged in the care of atopic dermatitis due to their multiple side effects and an unwanted rebound flare when they are discontinued, sometime they may be necessary to control a severe exacerbation. Short courses of systemic steroids were prescribed in 16% of the patients to control acute flares. It is important to institute intensified skin care during the taper of the steroids to suppress flares of the

dermatitis. Tar has anti-inflammatory properties and has been used to treat atopic dermatitis especially in the chronic stage. Five of the patients used tar preparations. This small number is probably due to the reluctance of patients to use tar because of its odor and propensity to stain clothes and bed-linen. Both ultraviolet B (UVB), UVAB and PUVA have been found to be effective in the treatment of atopic dermatitis by their immunological, antimicrobial and epidermis thickening properties.<sup>13,14</sup> Furthermore, PUVA has been shown to normalize growth in adolescents with severe atopic dermatitis who were previously growing poorly.<sup>14</sup> Two of the patients were on UVAB and one on PUVA, with moderate improvement enabling the use of steroids to be reduced.

In conclusion, the profile of atopic dermatitis in Singapore is similar to that reported in the Western literature except for a lower prevalence and a significant proportion of late onset atopic

dermatitis. Further studies in the community would be necessary to clarify these issues.

#### ACKNOWLEDGEMENT

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