

ATOPIC WINTER FEET IN CHILDREN¹

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Abstract. A mild foot dermatitis, characterized by erythema, scaling and painful fissures, and involving mainly the fore pads and plantar aspect of the big toes, is described in thirteen otherwise healthy children. There was an increased frequency of atopic disease in close relatives. White dermographism was conspicuous on the normal skin of the legs but could be induced only with the legs in supine position. This dermatitis, recurring in winter time for several years, is considered a manifestation of atopy.

Etiologic diagnosis of foot dermatitis relies partly upon its regional involvement and closely adjacent areas are prone to harbour quite different diseases. Examples of this are dermatophytosis originating in the outer toe-webs and extending to the soles; pustulosis affecting the central parts of the soles and the heel sides; and eczematous contact dermatitis involving dorsal parts of toes and feet. Atopic dermatitis may manifest itself as an exudative eczema on the dorsum of the feet in the infant, but more regularly as a dry lichenified infiltrate of the ankle folds in older children and adults. In both cases, itching is severe. In the present study, a mild plantar dermatitis is associated with the atopic state.

MATERIAL AND METHODS

The material consisted of 13 children attending the out-patient skin clinic at Malmö General Hospital. There were 7 boys and 6 girls, aged 6 to 14 years (Fig. 1). Their sole complaint was a mild dermatitis of the plantar surface of the feet and toes, occurring in winter time, often for several years.

The patients were questioned about earlier skin disease, atopic manifestation of self or relative, and wool sensitivity. Information was collected on the present dermatosis with regard to its duration and seasonal variation as well

as main regional points of attack. The children were asked about the type of cutaneous symptoms, for external factors aggravating the dermatosis, and possible ameliorating remedies.

The child was seated on a bed with legs horizontally elevated and the feet were examined for type and localization of the dermatosis. Then the shins were stroked lightly with the back of a ball-point pen to elicit a white dermographism.

A skin scraping of possibly squamous areas of the diseased soles was sent for mycologic culture (Inst. Med. Microbiology, Head: Prof. R. Grubb, Univ. Lund). Epicutaneous testing was performed according to generally accepted techniques. The patches were Al-test (Astra Agency, Imeco, Sweden)+Leukoflex (Beiersdorf, West Germany). The children were tested on the back with sixteen allergens (Table I). All tests were read 72 hours after application, i.e. 24 hours after removal. Patch tests were considered negative if erythema and infiltration or papules/vesicles did not appear.

A control material of 78 healthy school-children 8 years of age was studied for the occurrence of atopic manifestations in self or relatives. In all except two the shins were tested for white dermographism as above.

RESULTS

Localization. In the 13 children with foot dermatitis the parts mainly afflicted were the plantar aspects of the toes, particularly the big toe, and the fore part of the sole; details are given in Table II. A characteristic example is shown in Fig. 2. Symmetrical areas of both feet were always involved.

Signs. The diseased skin was slightly erythematous over a homogeneous, very thin infiltration with a diffuse border. There was a fine pityriasi-form or lamellar scaling. Superficial rhagades and/or deep fissures were common. The intensity of erythema varied from one visit to another; sometimes the skin was just dry and slightly scaling.

Symptoms. The main complaints about the

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Fig. 1. Age at start of "atopic winter feet" and at examination in thirteen children.

diseased skin was its dryness (all 13 cases), with development of fissures and erosions (9 cases). Only 4 children gave a history of slight itching while the main trouble in all cases was moderate pain from an irritated and sore skin. Bleeding was reported in 2 cases. Symptoms were aggravated by tight footwear, particularly rubber boots, in 5 children, and by nylon stockings in 2.

Evolution and therapy. The foot dermatitis started between the ages of 2 and 11 years (Fig. 1). At the time of examination the patients had experienced 2–7 annual recurrences (mean 4.1). In 10 children the dermatitis started gradually in the autumn and disappeared completely in the spring (Fig. 3). Only 3 children had some sort of skin trouble from their feet throughout the year with exacerbation during winter. There was little

Table I. Patch test substances and concentrations; the vehicle was petrolatum (formaldehyde: distilled water)

Allergen	Concentration (%)
Potassium dichromate	0.5
Paraphenylenediamine	1.0
Tetramethylthiuramdisulphide	2.0
Neomycin sulphate	20.0
Benzocaine	5.0
Nickel sulphate	2.5
Vioform®	5.0
Colophony	20.0
Wood tars	12.0
Wool alcohols	30.0
Mercaptobenzthiazole	2.0
Coal tars	5.0
Sterosan®	5.0
Balsam of Peru	25.0
Diphenylparaphenylenediamine	1.0
Formaldehyde	2.0

Table II. Areas involved in thirteen cases of "atopic winter feet"

Area	Cases
Fore part of sole	12
Plantar aspect of toe I	12
Plantar aspect of toe II	7
Plantar aspect of toe III	6
Plantar aspect of toe IV	4
Plantar aspect of toe V	4
Dorsal aspect of toe I	3
Rear part of sole	2
Sides of toes	2
Dorsal aspect of toe V	1
Interdigitally	1

difference in gravity from year to year in the individual case. The parents were frustrated by the inevitable annual reappearance and by the disappointing effect of topical therapy including antimicrobial agents and corticosteroids. With summer approaching the healing was always spontaneous.

It should be emphasized that this mild dermatitis, often with scaling and fissuring as main signs, and lacking the itching and infiltration of atopic eczema, will not benefit from fluorinated corticosteroids, at least not for continuous care. Topical therapy may often be restricted to indifferent emollients. In the author's experience, a 10% carbamide cream,² with or without hydrocortisone, has been particularly helpful, albeit it may hurt initially in fissures.

Atopy. The comparison between patients and healthy controls with regard to atopic disease showed one marked difference (Table III). Atopic dermatitis, bronchial asthma and/or allergic rhinitis occurred among close relatives (parents, brothers, sisters) in 7 of the 13 children with foot dermatitis. The corresponding figure in the controls was only 12 of 78 children. The increased frequency of atopic disease among close relatives to patients with foot dermatitis as compared with controls was statistically significant³ ($P < 0.01$). On the other hand, atopic disease among remote relatives occurred about equally in the two groups.

² Calmuril® (Pharmacia AB, Sweden). In some countries known under the trade name Calmurid®.

³ The analysis was performed with χ^2 -test by Harald Andersson, M.Sc., statistical adviser of the Swedish Medical Research Council.



Fig. 2. The mild plantar dermatitis of "atopic winter feet".

In the probands themselves symptoms of atopy could be traced in 4 children (Table III). One patient had had flexural eczema earlier in life, one flexural eczema and asthma; one patient had had asthma, and one asthma and rhinitis. None of the children had signs of eczema, asthma or rhinitis at examination. The greater frequency of the occurrence of earlier atopic disease in the probands than in the controls was statistically significant³ ($P < 0.01$). In 4 of the children information was obtained on skin irritability to wool.

White dermographism. All 13 patients demonstrated a white dermographism when tested on the healthy skin of the foreleg. The blanching was vigorous and appeared rapidly, about 5 seconds following the slight trauma.

Table III. Atopic disease in probands and relatives in two materials

	Patients (n = 13)	Controls (n = 78)
Proband	4	0
Close relative	7	12
Remote relative	2	11

In the control material the response to light stroking was more difficult to evaluate. In 49 of the 76 tested healthy 8-year-olds there was some type of blanching reaction, i.e. 64%. This was usually weak, however, and somewhat delayed, taking 10–15 seconds to appear. In 9 of the controls, however, the occurrence of white dermographism was similar in extent and speed to that in the patients.

When calculating the frequency of all types of white dermographism in patients and controls there was a slightly significant difference ($P < 0.05$)

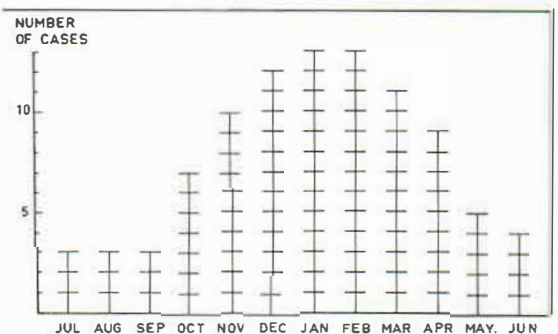


Fig. 3. Seasonal distribution of active dermatitis in thirteen children with "atopic winter feet".

between the groups.³ When counting the strong blanching reactions only, these occurred with a lower frequency in the controls than in the patients with foot dermatitis ($P < 0.001$).

It was remarkable that the white dermographism of the normal skin of the forelegs, both in patients and controls, could be induced with the legs in horizontal position only. When the legs were hanging vertically, or the child was standing, there was no response to the stroking, or a slight red reaction.

Laboratory tests. Epicutaneous tests and mycologic cultures, performed in all patients except one, were completely negative.

DISCUSSION

The cutaneous manifestations of atopy, developing from inflammatory and exudative lesions in infancy to dry and lichenified infiltrates in adult age are well known to every dermatologist. An eczema is more easily diagnosed as atopic dermatitis if typical areas are involved and itching is severe and continuous. There are, however, doubtless several dermatoses in adults, such as lichenified hand dermatitis with seasonal exacerbations, that are variants and late expressions of atopy.

In the present study a mild plantar dermatitis in childhood is associated with the atopic state. The clinical character of the lesions bears no resemblance to atopic dermatitis: it is neither exudative nor lichenified, and the severe itching is absent. The children of the present material did not show any signs of atopic dermatitis elsewhere on the body, nor of asthma or rhinitis. Nevertheless, a link to atopy could be demonstrated in two ways: an increased occurrence of atopic diseases in close relatives, and a strong white dermographism in the normal skin of the legs.

Despite a thorough search of old and new literature a full description of "atopic winter feet" has not been found. Costello & Gibbs, however, in their monograph (2) on palmo-plantar dermatoses mention a condition of "scaling, mild erythema and fissuring of the sole" that may occur in patients with active atopic dermatitis. It seems similar to the dermatitis described in the present study, although here other signs of atopic dermatitis were lacking.

Silvers & Glickman (12) have associated eczema

of the feet in children with atopy. They describe "an acute dermatitis consisting of erythema, fissuring, weeping, and crusting", which is "limited to the dorsal, lateral, and plantar surfaces of the great toes, and the dorsal aspects of the other toes". The dermatitis occurs mainly in hot weather and is thought to be due to "a lowered resistance to the effects of primary irritants". It differs thus from the dermatitis of the present study in its predominance on dorsal aspects of the toes and its seasonal variation.

White dermographism. There is an extensive literature on the cutaneous blanching occurring in atopic dermatitis as a response to various traumatic, thermic and pharmacologic stimuli. These phenomena are marked even in childhood (6). One of the reactions, white dermographism, is far from specific for atopic dermatitis since it may be demonstrated in other forms of chronic dermatitis as well (5, 11, 14). It seems established that white dermographism is an expression of peripheral vasoconstriction (7, 10) and elicited by skin tension (8).

As a matter of fact, a description of white dermographism provoked in normal skin may be traced a century back to Vulpian (13). Müller (9) observed "sekundäre Anämie", and Ebbecke (3) "Nachblassen" 10–30 sec after light stroking, with a duration of 1 to 2 min. They both stated that white dermographism occurred mainly in young people. Furthermore, it may be presumed that Lewis (8) performed his classical studies on "the white reaction" in normal subjects.

In the present study about two-thirds of healthy school-children showed some type of white dermographism. In the majority it was weak and somewhat delayed. In 12%, however, light stroking of the legs resulted in a strong and rapid blanching that did not differ from that observed in all thirteen children with winter feet. These findings strengthen the contention of white dermographism being an unspecific reaction in the individual case. Thus, we do not agree with the statement that white dermographism is always pathological and does not occur in a healthy population (5). On the other hand, considering the patients with plantar dermatitis as a group, the higher frequency of white dermographism in comparison with the controls supports the idea of an atopic background.

The finding of white dermographism on the

shins in horizontal though not in perpendicular position is important for future work in the field. It may explain contradictory results on the occurrence of this and other vasoconstrictory reactions, and also varying responses in a patient from one examination to another. Lewis (8) found that the minute skin vessels, *a priori* contracted by stroking or by adrenalin, were capable of resisting very high systemic pressures. The contractile force of the vessels when stimulated with adrenalin after the venous pressure was raised was considerably less. Similarly, if adrenalin was instilled into the dorsum of the foot of a man standing at rest, blanching did not appear, though it did if the venous pressure was relieved. A white dermographism occurring only in the recumbent subject is probably explainable on the same basis.

Thus, constitutional factors appear causative in children with "winter feet" while the pathogenesis is quite obscure. In any case, the dermatitis is not due to mycotic infection or contact allergy which otherwise might be suspected from the clinical picture. It is tempting to hypothesize that atopic winter feet in children may be caused by the vasoconstrictory tendency demonstrated in the present patients. More conspicuous examples of this may be found in patients with actual atopic dermatitis, namely "cooling reactions" in the toes of both adults (1, 4) and children (6).

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