Chronic actinic dermatitis: A clinical study of 15 cases in northern Taiwan

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ABSTRACT

Background: Chronic actinic dermatitis (CAD) is an idiopathic photosensitive dermatosis induced by ultraviolet B (UVB), sometimes ultraviolet A (UVA), and occasionally visible light. Diagnosis is suggested by the clinical findings, typically a chronic eczematous rash on the sun exposed areas, and confirmed by phototesting, which demonstrates the abnormal photosensitivity. The aim of this study was to determine the characteristics of CAD in Taiwanese patients.

Methods: We retrospectively reviewed the clinical and photobiological features of all patients diagnosed as having CAD at our institute from 2002 to 2012.

Results: A total of 15 patients with CAD were identified. The mean age at diagnosis was 58.6 years (range, 28–82 years). All the patients were males. The face, neck, forearms, and dorsal hands were most commonly involved. Eight patients (53.3%) had decreased minimal erythema dose (MED) to both UVB and UVA; six patients (40.0%) had decreased MED to only UVB; one patient (6.7%) had decreased MED to only UVA. All were managed with photoprotection and topical corticosteroids. Four patients received azathioprine (50 mg twice a day to every other day) and one received prednisolone (10 mg per day to every other day).

Conclusion: In Taiwan, CAD affects elderly men more commonly. The most common phototest results were decreased MED to both UVB and UVA, followed by to UVB alone. All patients were managed with photoprotection and topical corticosteroids, and some also required systemic agents, in particular azathioprine.
autoimmune diseases with photosensitivity such as lupus erythematosus or dermatomyositis.

Phototesting was performed using the following light sources: a UV 801 KL (Waldmann, Villingen-Schwenningen, Germany) equipped with four TL 20 W/12 fluorescent tubes (spectral output 285–350 nm, peak 310–315 nm; Philips, Eindhoven, The Netherlands) for UVB and six UV-A Cleo 40 W fluorescent tubes (spectral output 315–400 nm, peak 355–365 nm; Philips) for UVA. The back of each patient was exposed to five graded doses of UVB ranging from 20 mJ/cm² to 100 mJ/cm², with an increment of 20 mJ/cm² and five graded doses of UVA ranging from 3 J/cm² to 15 J/cm², with an increment of 3 J/cm². The MED was defined as the smallest exposure dose required to produce a minimally perceptible erythema with well demarcated borders. Erythema responses were read 24 hours after irradiation; if no response was observed at 24 hours, a second reading at 48 hours would be taken. If needed, a phototest was performed according to the guidelines of the International Contact Dermatitis Research Group to exclude photosensitive dermatitis or photoallergic contact dermatitis.

Results

Patient characteristics

A total of 15 patients with CAD were identified. The mean age at diagnosis was 58.6 years (range, 28–82 years). Most patients (>85%) had CAD after age 40 years. All the patients were males. Among the 15 patients, none of them were Fitzpatrick’s skin phototype I, II, or VI. Three patients were phototype III, 10 patients were phototype IV, and two patients were phototype V. All 15 patients were Han Chinese. The interval between disease onset and diagnosis of CAD confirmed by phototesting ranged from 1 month to >10 years. Demographic data are presented in Table 1 and Figure 1.

Clinical manifestations

The distribution of the eruptions, as shown in Figure 2, was characteristicly located on the sun-exposed areas. The face (93%) was the most commonly affected, followed by the dorsal hands (80%), arms (73%), and neck (60%; Figure 3). The morphology of the lesions included papules, patches, and plaques. Most were described as scaly or lichenified lesions. Itching was the most common symptom.

Discussion

The diagnosis of CAD is suggested by the clinical findings, most commonly a chronic eczematous rash on the sun exposed areas, and corroborated by phototesting, which characterizes the action spectrum and degree of photosensitivity. When necessary, histology of the lesional skin is used to exclude other disorders. In this study, we retrospectively reviewed the clinical features, phototest results, and treatment of CAD in a Taiwanese population. Our study showed that CAD commonly affected elderly men, with a remarkable male predominance and a mean age at diagnosis of 58.6 years, in line with previous reports. The lack of female patients in this study might be due to the small sample size. There has been evidence that CAD may occur in young patients with atopic dermatitis; however, the patient in our study who presented the disease at a relatively young age (Patient 2, age 28 years) did not have atopic dermatitis.

Table 1 Clinical and pathological data of the 15 cases.

<table>
<thead>
<tr>
<th>No.</th>
<th>Age</th>
<th>Sex</th>
<th>Int</th>
<th>Occupation</th>
<th>Histopathology</th>
<th>MED A</th>
<th>MED B</th>
<th>Treatment</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>51</td>
<td>M</td>
<td>4 y</td>
<td>Construction</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>C, F, BV, H, P</td>
</tr>
<tr>
<td>2</td>
<td>28</td>
<td>M</td>
<td>2 y</td>
<td>NA</td>
<td>NA</td>
<td>↓</td>
<td>↑</td>
<td>D</td>
</tr>
<tr>
<td>3</td>
<td>75</td>
<td>M</td>
<td>1 y</td>
<td>NA</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>F</td>
</tr>
<tr>
<td>4</td>
<td>50</td>
<td>M</td>
<td>2 mo</td>
<td>Postman</td>
<td>Superficial dermatitis</td>
<td>↓</td>
<td>↓</td>
<td>D, H</td>
</tr>
<tr>
<td>5</td>
<td>59</td>
<td>M</td>
<td>1 mo</td>
<td>NA</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>C, F</td>
</tr>
<tr>
<td>6</td>
<td>59</td>
<td>M</td>
<td>3 y</td>
<td>Salesman</td>
<td>Chronic cheilitis</td>
<td>↓</td>
<td>↓</td>
<td>AZT 50 mg bid for &gt; 2 y</td>
</tr>
<tr>
<td>7</td>
<td>71</td>
<td>M</td>
<td>10 y</td>
<td>NA</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>AZT 50 mg bid for 2 wk → LFU</td>
</tr>
<tr>
<td>8</td>
<td>40</td>
<td>M</td>
<td>3 y</td>
<td>Clerk</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>C</td>
</tr>
<tr>
<td>9</td>
<td>45</td>
<td>M</td>
<td>1 y</td>
<td>Construction</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>AZT 50 mg qd for 3 wk, DC due to nausea and vomiting → C</td>
</tr>
<tr>
<td>10</td>
<td>50</td>
<td>M</td>
<td>1 y</td>
<td>Salesman</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>C, F</td>
</tr>
<tr>
<td>11</td>
<td>61</td>
<td>M</td>
<td>3 y</td>
<td>Carpenter</td>
<td>Hypersensitivity reaction</td>
<td>↓</td>
<td>↓</td>
<td>C, D, H, BD</td>
</tr>
<tr>
<td>12</td>
<td>69</td>
<td>M</td>
<td>5 y</td>
<td>Farmer</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>AZT 50 mg qd for 2 wk → LFU</td>
</tr>
<tr>
<td>13</td>
<td>74</td>
<td>M</td>
<td>10 y</td>
<td>NA</td>
<td>Chronic dermatitis</td>
<td>↓</td>
<td>↓</td>
<td>Prednisolone 10 mg qd for 24 d → 10 mg qd for 16 wk → LFU</td>
</tr>
<tr>
<td>14</td>
<td>66</td>
<td>M</td>
<td>1 mo</td>
<td>Businessman</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>C, F</td>
</tr>
<tr>
<td>15</td>
<td>82</td>
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<td>1 y</td>
<td>NA</td>
<td>NA</td>
<td>↓</td>
<td>↓</td>
<td>C, D, F, BD</td>
</tr>
</tbody>
</table>

AZT = azathioprine; BD = betamethasone dipropionate; bid = twice a day; BV = betamethasone valerate; C = clobetasol; D = desoximetasone; F = fluticasone; qd = each day; LFU = loss of follow-up; Int = interval between disease onset and diagnosis of CAD; MED A = MED to UVB; MED B = MED to UVA; NA = not applicable; P = pimecrolimus.

*Patient 11 has been reported previously.*
have atopic diathesis. Immunoglobulin (Ig)E level was measured in three of the patients. Patient 2 had an IgE level of < 2 IU/mL. Patients 7 and 11 had slightly elevated IgE levels of 329 IU/mL and 170 IU/mL, respectively (normal range, 0–100 IU/mL).

Some authors have noticed an association between increased sun exposure and CAD. Therefore, we also list the occupation of these patients in Table 1.

Abnormal photosensitivity is the hallmark of CAD. Historically, it has been suggested that all CAD patients have a reduced MED to UVB, the majority also have a reduced MED to UVA, and a minority respond to the visible wavelengths as well. In addition, UVA sensitivity dissociated from UVB sensitivity has been implicated as a relative indicator of drug induced photosensitivity or photoallergic contact dermatitis (PACD). However, lowered MED to UVA only in otherwise typical CAD cases has been increasingly reported. In our study, the majority of the patients (53.3%) had reduced MED to both UVB and UVA, in keeping with the common observations in the literature. Interestingly, a significant portion (40.0%) of our patients had reduced MED to only UVB, compared with just 6.7% to only UVA. This was similar to the study results in Singaporean and Korean populations. By contrast, other studies found reduced MED to only UVA more common than reduced MED to only UVB in the Greek, Australian, and United States populations. The reason for the discrepancy remains unclear and ethnic or geographical factors may contribute to it.

Patch and photopatch tests are ancillary tools in patients with suspected CAD to exclude allergic contact dermatitis (ACD) and PACD. Up to 75% CAD patients were reported to have positive reactions in patch or photopatch tests. In our institute, we do not perform patch and photopatch tests routinely if the patient does not have a history of exposure to an allergen or photosensitizer. This is a shortage that the possibility of ACD/PACD or concurrent ACD/PACD and CAD cannot be excluded in this study. Patient 11 was a construction worker having contact history to formaldehyde and melamine; patch testing with the standard tray and his contactants

![Figure 1](link-to-figure1.png) Age distribution of disease onset.

![Figure 2](link-to-figure2.png) Distribution of the involved areas.

![Figure 3](link-to-figure3.png) Clinical pictures. (A) Patient 7 showing infiltrated eczematous eruptions on the face: the folds and creases are relatively spared. (B) Close view of forehead lesions: the creases and upper eyelids are relatively spared. (C) Patient 11: a clear cut-off where clothing begins is often seen on the arms.
showed positive reactions to potassium dichromate and nickel sulfate. Patient 13 also received photopatch tests in order to exclude drug-induced photosensitivity and PACD and the results were negative.

The etiology of CAD is still not well understood. Evidence suggests that CAD is a delayed type hypersensitivity reaction to endogenous photoinduced antigens. The action spectrum for CAD has been shown to resemble that for sunburn in normal individuals, for which the chromophore is considered to be DNA. This implicates DNA or a similar or related molecule being the presumed photoallergen. Additionally, the prevalence of coexisting contact or photocontact allergy in CAD patients may play a role in CAD pathogenesis. Certain contact allergens, such as fragrance materials and colophony, which are potentially phototoxic, may be able to convert endogenous proteins into allergens. Another hypothesis proposes that a failure in the normal suppression of delayed type hypersensitivity by UV irradiation may be involved. It is likely that combinations of some of the aspects account for the pathogenesis of CAD.

The abnormal photosensitivity of CAD may resolve in a significant proportion of patients. Dawe et al reported that the probability of resolution of photosensitivity in 5 years, 10 years, and 15 years is 7%, 22%, and 45% respectively. Severe UVB photosensitivity and allergy to two or more patch test series are indicators for a poor prognosis.

All CAD patients should be advised to avoid UV exposure and contact with associated allergens or photoallergens. The approach to topical treatment is as for other dermatitis conditions. Topical corticosteroids are often required, and successful responses to topical tacrolimus and pimecrolimus have also been reported. For severe or refractory cases, phototherapy or systemic immunomodulators may be required. Psoralen combined with UVA and narrow band UVB have been shown to be effective in some cases, particularly with the use of systemic corticosteroids, cyclosporine, or other immunosuppressants to assist tolerance in the early phases of treatment.

Azathioprine is the only therapeutic agent that has been evaluated in a double blinded, placebo-controlled trial among the various treatment options for CAD. Remission has been demonstrated in two-thirds of patients after receiving azathioprine 100–150 mg daily for several months. Cyclosporine, mycophenolate, methotrexate, hydroxyurea, thalidomide, hydroxychloroquine, etretinate, and danazol have been reported to be beneficial in a number of cases. Successful management with demabrasion in a CAD patient not responsive to topical and local corticosteroids and other immunosuppressants has also been reported.

In conclusion, we showed that CAD in Taiwan affects elderly men more commonly and decreased MED to both UBV and UVA is the most frequent photobiological feature. Because our findings are based on the retrospective analysis of a limited number of cases, further investigations may be needed to confirm the results of the present study.

References


Figure 4 Comparison between the phototest features of chronic actinic dermatitis and patients of different countries.


