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# Nine case series with phototoxic dermatitis related to *Chenopodium album*

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## Abstract

*Chenopodium album* L. ssp. *album* is a common plant species worldwide, especially in humid areas. Sun exposure after oral intake of the plant can lead to sunburn-like rashes owing to its furocoumarin content. In this article, we reported nine patients who developed dermatitis with edema, erythema and necrosis on the face and dorsum of the hands. Each was exposed to sunlight after eating selemmez (the vernacular name of *C. album* L. ssp. *album*). The plant samples analyzed by an expert botanist were described as *C. album* L. ssp. *album* belonging to Chenopodiaceae family.

## Keywords

*Chenopodium album*; furocoumarin; phototoxic dermatitis

## Introduction

*Chenopodium album* or wild spinach is a fast-growing weedy annual plant of the genus *Chenopodium*. It is also known by different names such as silmask and selemmez and is consumed as a food in some regions. Exposure to the sun after eating this plant may cause angioedema and tissue necrosis.<sup>1</sup> This reaction is most likely related to its furocoumarin content.

## Case I

A 45-year-old female was admitted to our clinic with complaints of swelling and erythema in her face and hands. The patient developed swelling and erythema in the eyes and lips 1–2 hours after being exposed to sunlight. Her medical history revealed that she consumed the meal containing wild spinach the day before. Other family members, who ate the same meal, did not develop a similar reaction. However, they were not exposed to sunlight. The rest of the patient's medical history including drug use, contact with irritants or insect bites and family history were unremarkable.

On her dermatologic examination, livid color necrotic areas were present on the cheeks and nasal dorsum along with marked edema on the eyelids, lips

and the dorsum of hands (Figure 1). The peripheral pulses were palpable. The white blood cell count was 16,700 per mm<sup>3</sup> (with 76% neutrophils dominance); however, no infection focus was detected. The initial fasting blood glucose was 178 mg/day and the subsequent fasting blood glucose was 105 mg/day. The other laboratory tests were unremarkable.

The patient was treated with 20 mg/day of oral systemic methyl prednisolone, hydroxyzine HCl one tablet daily, naproxen sodium two tablets daily, topically wet dressing with isotonic NaCl solution three times per day for 30 minutes and prednicarbate lotion twice daily. Pentoxifyllin 400 mg three times daily

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**Figure 1.** Severe edema and necrosis development in the face and the hands.

and acetylsalicylic acid 300 mg one time daily were added for the treatment of cyanosis that the patient developed on follow-up. At the end of the second week, there was some noticeable improvement. However, patchy ulcerated areas and necrotic crusts were still present. The gangrenous lesion in the hand was surgically debrided.

### Cases 2–9

All features of the other patients are summarized in Table 1. In two of the cases, the blood glucose levels were increased, and they were diagnosed with diabetes mellitus (Figure 2). All subjects stated that their complaints started a few days after consuming the same plant and subsequent exposure to sunlight. All patient's family members, who ate the same meal, did not develop a similar reaction.

The plants eaten by the subjects were analyzed at the Department of Biology, Botany Section of Yuzuncu Yil University. All the plants were described as *C. album* L. spp. *album* (Figure 3).

## Discussion

*C. album* is an annual herb with fibrous route. Its leaves have various colors from yellow to green. This plant grows worldwide in humid and open areas, particularly under direct exposure to sunlight and where the soil contains rich animal manure. It blooms between 2 and 10 months. It grows in Eastern Anatolia and is commonly consumed by cooking the fresh parts.<sup>1–5</sup> In addition, the plant is a ubiquitous weed that is cultured in India as a fodder and pot herb.<sup>6</sup> The cases presenting with photosensitization and angioedema-like eruption on sun-exposed skin areas have been seen following its ingestion as a green vegetable or cooked meal.<sup>6,7</sup>

*C. album* includes nitrate, phosphate and oxalate salts, sugars, chlorophyll, fat, laxative, iron salts, iodine, vitamins (B, C, and D), betalain alkaloids, phenolic acid, betaine, oxalic acid, oleanolic acid, sitosterol, beta-carotene, saponin and furocoumarines.<sup>1,5</sup> *C. album*, one of the poisonous plants found in Oregon, is a potentially hazardous to cattle and other livestock. It may cause nitrate and oxalate poisoning. The plants uptake nitrates from the soil and metabolize them to form the plant proteins. If plants uptake excess nitrates and are consumed by livestock before the nitrates are converted into proteins, nitrate poisoning may develop. If large quantities of oxalate-accumulating plants are consumed, the rumen is overwhelmed and unable to metabolize the salts that may secrete into the bloodstream. In the bloodstream, they form insoluble salts that precipitate in the kidney, causing kidney failure.<sup>8</sup>

Phototoxic dermatitis is postulated to develop secondary stimulation of furocoumarines. The topical application or systemic ingestion of the plants containing furocoumarines can cause erythema, edema, vesicle and bulla formation and afterward hyperpigmentation mimicking sunburn after exposure to sunlight.<sup>1,9,10</sup> The reasons for the other family members who ate the same meal not having similar reactions are that (1) each subject has different sensitivity thresholds for developing a similar reaction and (2) the other family members were not exposed to sunlight enough to develop symptoms.

Reactions similar to angioedema, necrosis and subsequent postinflammatory hyperpigmentation had been observed in the previous cases that developed phototoxic dermatitis against *C. album*.<sup>1,9</sup> Necrosis and subsequent hyperpigmentation were observed in our cases as well. The cyanosis in the hands may be due to a partial inhibition of oxygen transportation

**Table 1.** Summarized features of cases 2–9

| Cases  | Age/sex   | Duration of sunlight exposure (hours) | The duration of lesion formation after sunlight exposure (hours) | Interval after the digestion of the plant (hours) | Fasting blood glucose (mg/day) | Development of diabetes mellitus                                     | Remission time (weeks) | Development of necrosis | Clinical features                                                                                                                                | Treatment                                                                                                                                                                                                               |
|--------|-----------|---------------------------------------|------------------------------------------------------------------|---------------------------------------------------|--------------------------------|----------------------------------------------------------------------|------------------------|-------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Case 2 | 47/Female | 1                                     | 4                                                                | 4                                                 | 205                            | Blood glucose was high on follow-up, diagnosed as diabetes mellitus. | 2                      | Yes                     | Marked edema in the face and hand dorsum, lived ecchymotic patches                                                                               | Hydroxyzine hydrochloride tb 1 × 1, naproxen sodium tb 2 × 1, metformin 1 × 1, wet dressing with isotonic sodium (SF), collagenase clostripredase A pomade 1 × 1, mupirocin pomade 2 × 1                                |
| Case 3 | 50/Female | 2                                     | 5                                                                | 12                                                | 250                            | Blood glucose was high on follow-up, diagnosed as diabetes mellitus  | 2                      | Yes                     | Marked edema in bilateral eyelids and hands, palmar area is normal                                                                               | Prednisolone 20 mg 1 × 1, Hydroxyzine hydrochloride 10 mg 1 × 1, wet dressing with isotonic sodium, naproxen sodium 2 × 1, metformin tb 1 × 1                                                                           |
| Case 4 | 42/Female | 1                                     | 4                                                                | 16                                                | 145                            | Blood glucose was normal on follow-up                                | 1                      | Yes                     | Marked edema in the face and hand dorsum                                                                                                         | Prednisolone 40 mg/day, loratadine tb 1 × 1, wet dressing with isotonic sodium, mometasone furoate pomad 1 × 1                                                                                                          |
| Case 5 | 41/Male   | 3                                     | 5                                                                | 16                                                | 100                            | Blood glucose was normal on follow-up                                | 1                      | No                      | Livid erythematous patches in nasal dorsum, in the cheeks and hand dorsum, ecchymosis in some areas                                              | Loratadine 10 mg 1 × 1, mometasone furoate pomade 2 × 1                                                                                                                                                                 |
| Case 6 | 30/Female | 2                                     | 6                                                                | 5                                                 | 188                            | Blood glucose was normal on follow-up                                | 2                      | Yes                     | Edema in the face and 1/3 distal of bilateral fore arms and filling the whole hand dorsum, livid patches in the dorsum of the nose and the hands | Pentoxifyllin 3 × 400 mg/day, low-molecular-weight heparin 0.6 ml/day, naproxen tb 2 × 500 mg/day, cetirizine tb 1 × 1 per day, basitrasin 500 IU/g, Neomisin sulfat 5 mg/g cream, collagenase clostripredase A pomade. |
| Case 7 | 53/Female | 3                                     | 4                                                                | 4                                                 | 147                            | Blood glucose was normal on follow-up                                | 1                      | No                      | Livid erythematous patches in the nose and hand dorsum along with mild edema                                                                     | Pentoxifyllin 3 × 400 mg/day, mometasone furoate pomad                                                                                                                                                                  |
| Case 8 | 50/Female | 2                                     | 5                                                                | 18                                                | 154                            | Blood glucose was normal on follow-up                                | 2                      | Yes                     | Necrotic areas in the nasal dorsum and in the cheeks along with edema                                                                            | Prednisolone 20 mg /day, methylprednisolone pomade 1 × 1, hydroxyzine hydrochloride tb 1 × 1, wet dressing with isotonic sodium                                                                                         |
| Case 9 | 25/Female | 3                                     | 7                                                                | 13                                                | 138                            | Blood glucose was normal on follow-up                                | 1                      | No                      | Livid erythematous ecchymotic patches in the dorsum of the nose and the thumb                                                                    | Mometasone furoate pomade 1 × 1, hydroxyzine hydrochloride tb 1 × 1, wet dressing with isotonic sodium                                                                                                                  |

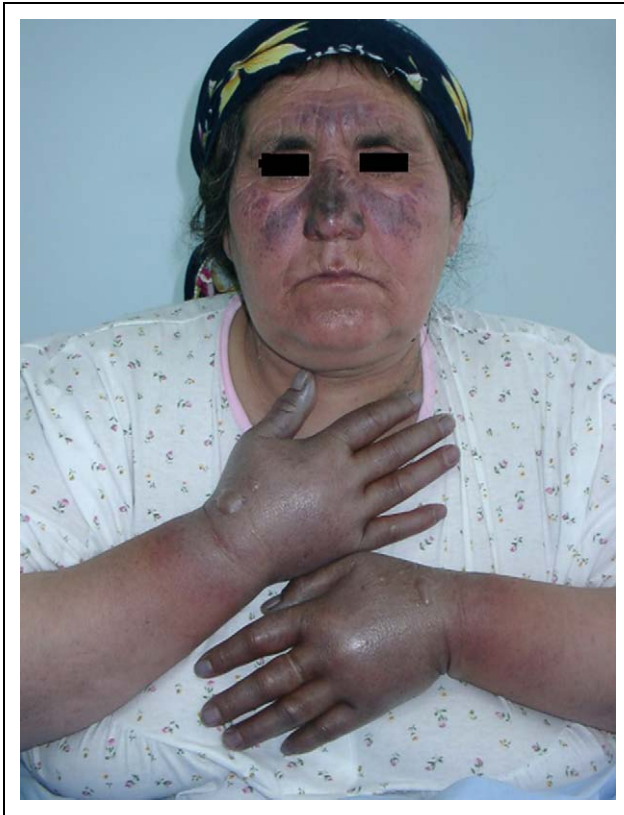


**Figure 2.** Severe edema and ecchymotic patches in the face and hand dorsum.



**Figure 3.** *Chenopodium album* L ssp. *album*.

by blocking the hemoglobin-binding sites. Another cause for cyanosis of the hands may be the inflammatory edema due to reactive oxygen species forming as a result of phototoxic process. The reactive oxygen species may damage venular capillary walls that lead to increase in tissue oncotic pressure and combined vasodilatation and circulatory stasis.

In all cases, hyperglycemia was detected at the beginning of treatment and their blood glucose returned to normal on follow-up. However, blood glucose remained high during the follow-up of two cases, and they were started on oral antidiabetic treatment after being diagnosed with diabetes. There was no history of diabetes in these two cases; however, it is not clear whether they have underlying diabetes that were incidentally diagnosed or if the chemicals in *C. album* may trigger diabetes itself. Further studies are needed to enlighten this issue.

Wet dressings, cool moist compresses, topical steroids and nonsteroidal anti-inflammatory drugs and fluid replacement are mainstay treatments of phototoxic dermatitis. Systemic steroids may be used in severe conditions.<sup>11</sup> In some cases, systemic corticosteroids were administered; however, the necrosis formation could not be prevented. Similarly, systemic corticosteroids were used in most of our cases, but the development of necrosis could not be prevented. Systemic corticosteroids were not administered in two of our cases, but the necrosis formation could not be prevented either. The addition of pentoxifyllin and low-molecular-weight heparin to the treatment protocol may partially prevent the necrosis formation.

The *C. album*-induced phototoxic dermatitis is a nutrition- and environment-related cutaneous condition that may lead to superficial necrosis rarely. People who live in areas where this plant grows should be warned and informed on its complications.

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### Declaration of Conflicting Interests

The authors declared no conflicts of interest.

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