Green Hair Caused by Copper Present in Cosmetic Plant Extracts

A.	Antonella	Tosti
D.	Donatella	Mattioli
C.	Cosima	Misciali

Bologna

Antonella Tosti, Donatella Mattioli, Cosimo Misciali, Department of Dermatology, University of Bologna, Via Massarenti 1, 40138, Bologna (Italy)

To the editor

Green discoloration of hair is well known as a consequence of copper exposure [1-5]. It can occur in copper workers [1], and it has been described following exposure to swimming pool water containing copper [2]. The following report describes a patient who developed a green discoloration of the hair after using a hair cosmetic containing *Cassia obovata*.

Case Report

A 27-year-old woman suddenly developed green-tinted hair after applying a neutral henna preparation for strengthening her hair. The patient had naturally long light blond hair and used to swim in a chlorinated swimming pool during weekends. She had highlighted her hair 2 years before. A week before examination, the patient had used a natural henna product containing *C. obovata* in order to 'protect her hair against pool disinfectants'.

The history revealed that after having washed her hair, the patient prepared a creamy paste by mixing 50 g of henna powder with warm water and applied it to her scalp for 15 min as instructed by the manufacturer. Immediately after washing off the henna paste, she noticed a dark green discoloration of the hair.

On the clinical examination numerous green hair tufts were evident in the patient's scalp.

Scanning electron-microscopic examination of the affected hair showed loss of cuticles and the presence of hair shaft surface alterations.

The manufacturer of the henna informed us that the cosmetic, imported from India, consisted of powdered leaves of *C. obovata*. A chemical examination of the henna powder showed that it contained copper (7.75 ppm), lead (2 ppm), zinc (134 ppm) and nickel (83 ppm). The green discoloration gradually disappeared in a few months.

Discussion

C. obovata leaves contain free anthraquinones, their O and C glyco-sides and free sugars. To our knowledge none of these ingredients can cause a green discoloration [6]. The powdered leaves of *C. obovata* used by our patient were however found to contain a significant amount of copper, and deposition of copper in the hair is known to produce a green discoloration in blond-haired people. Exposure to copper may result from several sources: occupation as copper workers [1,3], swimming pool water with copper-based algicides [2, 4] or the presence of copper in water supplies due to drawing off the metal from household piping [3]. Greening of the hair does not occur after systemic absorption of copper [5].

Thresholds of concentration beyond which discoloration of the hair appears are not known. Hair discoloration has however been reported after swimming in a pool containing a very low concentration of copper (0.9 ppm) [2],

Hair damage resulting from mechanical trauma and previous hair bleaching or dying is considered a predisposing factor for the development of this peculiar hair discoloration [4].

Our report suggests that plant extracts should be added to the list of possible sources of copper exposure.

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Darier's Disease and Corneal Opacity

Dear Sir,

- Tear film

- Surface cells

-Wing cells

Epithelium-■-

Basement 7

Bowman's layer

The cornea and conjunctiva can be considered as modified skin , and cutaneous disorders, especially that involving the epidermis, also affect the corneal epithelium. The epithelium, derived from the surface ectoderm is a 5- to 6-cell layer forming 10% of the corneal thickness; the stroma which is of mesodermal origin forms about 90% [1]. The basal

cells that are attached to the basement membrane by hemidesmosomes give rise to wing cells which become the surface cells and are shed into the tears (fig. 1); thus, the corneal epithelium is structurally and physiologically somewhat similar to the epidermis. A case of Darier's disease with a peripheral corneal opacity is reported to stress the importance of examining the eyes in this genodermatosis.

A 36-year-old Malay lady was referred to the Skin Clinic for a spreading papular, warty lesion on the body since childhood. She was treated in the Eye Ward for a small left corneal ulcer of undetermined cause. The patient was a gravida 8, para 7, in 34 weeks of gestation with no history of injury or foreign body in the eye. She presented with redness, pain, lacrimation and photophobia of the affected eye which on slit-lamp examination showed fluorescein staining of the cornea at the 6-o'clock position and few cells at the anterior chamber. She was treated with mydriatics and antibiotics, and after a week, the ulcer healed leaving an oval opacity. A skin biopsy confirmed Darier's disease; her second son was also affected. We decided to start her on etretinate after a post-partum bilateral tubal ligation.

There are several skin disorders, especially genodermatoses, which are associated with corneal changes. In a study involving 21 patients with Darier's disease, various ocular abnormalities were observed [2]; unique peripheral corneal opacities, central corneal surface irregularities and keratotic plaques on eyelids were seen in 16 patients. The opacities were teardrop-sized to tiny, clustered oval-shaped lesions, and the irregularities were distributed in a radiating cobweb pattern. In two patients trephine biopsy of the opacities showed epithelial oedema especially of the basal cells and thickened basement membrane – features that are different from the skin pathology because the cornea is not a keratinizing epithelium. Darier's disease in two brothers associated with retinitis pigmentosa has also been reported [3]. In view of the high prevalence of ocular involvement in this disease, it may be prudent to refer these patients for an ophthalmological examination before systemic retinoid therapy is initiated.

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Kader N. Mohamed Department of Dermatology General Hospital 10990 Penang (Malaysia)

Stroma

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Descemet's _ membrane
Endothelium ““““

Fig. 1. Cross-section of the permission.
cornea. From Kanski [1], with

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