

Phytophotodermatitis related to carrot extract-containing sunscreen

SS Bosanac¹, AK Clark¹, RK Sivamani^{2,3} MD MS CAT

Affiliations: ¹School of Medicine, University of California Davis, Sacramento, California, ²Department of Dermatology, University of California Davis, Sacramento, California, ³Department of Biological Sciences, California State University Sacramento, Sacramento, California

Corresponding Author: Raja Sivamani MD MS CAT, Department of Dermatology, University of California, Davis, 3301 C Street, Suite 1400, Sacramento, CA 95816, Email: raja.sivamani.md@gmail.com

Abstract

Phytophotodermatitis is a clinical diagnosis from phototoxicity of the skin induced by contact with plants or their extracts. Phytophotodermatitis may present with burning, erythema, patches, plaques, vesicles, bullae, or hyperpigmented patches in well-demarcated and unusual shapes. Inquiring about occupation, hobbies, and plant or plant extract contact is essential to establishing the diagnosis. Herein we present a case of phytophotodermatitis after use of carrot extract-containing sunscreen presenting as a hyperpigmented patch in a geometric distribution with accentuation of pigment within the dynamic rhytides.

Keywords: phytophotodermatitis, furocoumarins, hyperpigmentation, carrots

Introduction

Phytophotodermatitis is a term coined by Klüber in 1942 to describe cutaneous phototoxic eruptions that result from contact with plants or plant extracts followed by exposure to sunlight [1]. There are numerous plants implicated in phytophotodermatitis including wild parsnip, parsley, celery, carrots, lime, and fig. These plants contain natural photosensitizing compounds called furocoumarins, which are thought to provide anti-fungal protection to the plant [2]. However, when furocoumarins are ingested or applied to human skin, they are activated by ultraviolet light, which leads to production of reactive oxygen species, cellular damage, phototoxicity, and skin eruptions [3].

A recent study measured the total furocoumarin concentration in various foods and beverages and showed that grapefruit juice (95341 ng/g), fresh parsley (23215 ng/g), grapefruits (21858 ng/g), lime juice (14580 ng/g), limes (9151 ng/g), and lemon juice (1561 ng/g) had the greatest concentration of furocoumarins [4]. Additional foods with high furocoumarin concentration included celeriac (also known as turnip-rooted celery, celery root, or knob celery), (396 ng/g), parsnips (335 ng/g), and carrots (68 ng/g), [4].

Case Synopsis

A healthy, 32-year-old woman presented to dermatology clinic for discoloration on her forehead, which she reported to have appeared on-and-off over a period of two years. She denied applying any medications to her forehead. She is a runner and reported occasional application of a sunscreen containing carrot extract (Yes To Carrots Daily Facial Moisturizer with SPF 15 by Yes to, Inc.) to her forehead before jogging outdoors. She denied associated pruritus or pain. Her past medical and family history was unremarkable. In particular, she denied a history of melasma. The physical examination was significant for a subtle hyperpigmented patch in a geometric distribution on her central forehead with accentuation of pigment within the dynamic rhytides, visualized with the use of a Woods lamp (**Figure 1**). There were perpendicular streaks of pigmentation that streaked downward away from the rhytides. There was no evidence of melasma on visible light or Woods light exam. Based on the history and physical exam findings, a diagnosis of phytophotodermatitis to carrot extract-containing sunscreen was made.



Figure 1. A) *Hyperpigmented patch in a geometric distribution on central forehead.* B) *Woods lamp exam. Accentuation of pigment within the dynamic rhytides and perpendicular streaks of pigmentation streaking downward away from the rhytides.*

Biopsy was deferred owing to likely visibility of the resulting scar. Although it was not confirmed that carrot extract was responsible for our patient's hyperpigmentation, it was the most likely culprit after evaluating the sunscreen ingredient list. The patient was advised to discontinue use of this product and avoid other products containing carrot extract. Eight weeks after discontinuing the product the patient noted 25% improvement in pigmentation.

Discussion

We describe a 32 year-old woman with phytophotodermatitis to carrot extract-containing sunscreen involving the central forehead. The clinical presentation, geometric distribution of hyperpigmentation, pigment accentuation within

the dynamic rhytides, and downward streaking of pigment from the dynamic rhytides as evidenced on Woods lamp exam, were diagnostic.

We conducted a literature search on PubMed until year 2017 and it resulted in only one case report on carrot-induced phytophotodermatitis. The case was a 24-year-old woman who used a decoction of fresh wild carrots boiled in water as wet compresses for swelling of her left foot [5]. She applied compresses thrice daily for three days and the same areas were exposed to sunlight daily. After three days, she noted a burning sensation and erythema, without pruritus. Symptoms resolved after wet compresses were discontinued and sunlight avoidance was advised. However, the residual well-demarcated dark brown patches on the dorsum of the left foot remained and took one month to improve and three months to fade.

Phytophotodermatitis is a clinical diagnosis, thus inquiring about patient's occupation and hobbies and contact with plants or plant extracts is critical in establishing the diagnosis. Phytophotodermatitis may present with a burning sensation, erythema, patches, plaques, vesicles, bullae, or hyperpigmented patches without previous erythema, which may take six months to resolve [6]. In contrast to suntan, hyperpigmentation of phytophotodermatitis produces well-demarcated lesions with unusual shapes [6]. In the case of sunscreen use on the forehead, sunscreens can accumulate in the dynamic rhytides, as was seen in our case. Treatment of phytophotodermatitis involves removal of the offending agent. In acute phytophotodermatitis, cool wet compresses may be helpful, whereas topical corticosteroids may provide relief in severe eruptions.

Although our patient did not experience an acute reaction to her sunscreen, her history of hyperpigmentation is similar to the case report described in the literature. As noted, our patient's hyperpigmentation improved eight weeks after she discontinued use of the product containing carrot extract. Our patient practiced sun avoidance and used tretinoin 0.025% cream three times weekly during this period. She was advised that she may continue tretinoin 0.025% cream use nightly as it may help with further pigment correction.

Conclusion

Phytophotodermatitis should be considered in a patient who presents with pigmented brownish macules or patches in sun exposed areas, especially if they have bizarre shapes. A proper history is required to establish the diagnosis.

References:

1. Klaber R. Phyto-photo-dermatitis. *Br J Dermatol*. 1942;54(7):193-211. DOI: 10.1111/j.1365-2133.1942.tb10682.x.
2. Son JH, Jin H, You HS, Shim WH, Kim JM, Kim GW, Kim HS, Ko HC, Kim MB, Kim BS. Five cases of phytophotodermatitis caused by fig leaves and relevant literature review. *Ann Dermatol*. 2017;29(1):86-90. [PMID: 28223753].
3. Ostertag E, Becker T, Ammon J, Bauer-Aymanns H, Schrenk D. Effects of storage conditions on furocoumarin levels in intact, chopped, or homogenized parsnips. *J Agric Food Chem*. 2002;50(9):2565-70. [PMID: 11958623].
4. Melough MM, Lee SG, Cho E, Kim K, Provas AA, Perkins C, Park MK, Qureshi A, Chun OK. Identification and quantitation of furocoumarins in popularly consumed foods in the U.S. using QuEChERS extraction coupled with UPLC-MS/MS analysis. *J Agric Food Chem*. 2017;65(24):5049-55. [PMID: 28581738].
5. Zhang RZ, Zhu WY. Phytophotodermatitis due to wild carrot decoction. *Indian J Dermatol Venereol Leprol*. 2011;77(6):731. [PMID: 22016300].
6. Deleo VA. Photocontact dermatitis. *Dermatol Ther*. 2004;17(4):279-88. [PMID: 15327473].