

Phytophotodermatitis in Rijeka Region, Croatia

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ABSTRACT

Contact with plants can cause phototoxic or rarely photoallergic reactions. Phototoxic dermatitis (photophytodermatitis) occurs after contact or ingestion of plants containing furocoumarins i.e. psoralens and followed by sun exposure. Skin lesions develop usually after 24–48 hours with erythema, bulla formation, itch or pain, followed by a long lasting hyperpigmentation. Furocoumarins can be linear i.e. psoralens (5-MOP, 8-MOP), or angular like angelicin and pimpinellin. Their binding to DNA causes cellular damage. This can happen in florists, gardeners, farmers, horticulturists, food handlers, and botanists. The plants causing phototoxic reaction can vary with the local flora but are commonly a member of the family apiaceae (formerly umbelliferae), family rutaceae, leguminosae and moraceae. The authors give special consideration to the phytophotodermatitis that appeared in their region in spring and summer during a three year period.

Key words: photodermatitis, psoralens, apiaceae, moraceae

Introduction

Three thousand years ago Egyptian used the juice of *ammy majus* and exposure to sunlight to cure vitiligo, and in India people used extracts of *psoralea corylifolia*^{1,2} for treating the same disease. For centuries men used plants as food and for remedies³. They also learned that some plants can be harmful. On the skin, plants can cause phyto dermatitis: irritant contact dermatitis, allergic contact dermatitis, photoallergic contact dermatitis, and phototoxic reaction (phytophotodermatitis)⁴.

Phytophotodermatitis is an inflammatory skin disease resulting from contact with certain plants containing furocoumarins followed by sunlight exposure. The term was introduced by Klüber in 1942⁵. Contact with plants and exposure to sun rays can cause phototoxic and photoallergic reactions. Phototoxic dermatitis (phytophotodermatitis) is a non immunologic reaction which can develop after sufficient phototoxic substance in the plant is given to individual followed by sunlight exposure, especially UVA rays. Phototoxic reactions are more common than photoallergic reactions, and occur generally in spring or summer. Clinical features develop on sun exposed areas, most commonly involved are dorsa of the hand, forearms, face and lower limbs. Lesions appear usually after 12–48 hours and are characterized by erythema, blistering, burning, pain, with a bizarre pattern,

and hyperpigmentation that may persist for many months⁶. Moistness facilitates the transfer of the phototoxic substances into the skin. Phytophotodermatitis is mostly caused by contact or rarely by ingestion of plants containing photosensitisers⁶. The purpose of this paper is to present cases of phytophotodermatitis observed at our Department during a period of three years.

Materials and Methods

Among all cases of photodermatitis seen at the Department of Dermatovenereology, Clinical Hospital Centre of Rijeka, during the three year period 2003–2005, there were 16 cases of phytophotodermatitis in children and adults. The essential inclusion criteria were lesion on the sun exposed skin, and history of contact with plants. All patients denied the use of drugs. We analyzed the sex distribution, the month in which the lesion appeared, topographical distribution, work activity, and the causing plant if possible.

Results

From April 2003 to October 2005, the patients with phytophotodermatitis were analyzed. Table 1 shows there

TABLE 1
PLANTS CAUSING PHYTOPHOTODERMATITIS IN MALES
AND FEMALES

	Male	Female	Total N (%)
Figs	2	1	3 (18.7)
Celery	–	2	2 (12.5)
Parsley	–	2	2 (12.5)
Rue	–	1	1 (6.5)
Carrot	–	1	1 (6.5)
Weeds	2	1	3 (18.7)
Unknown	2	2	4 (25.0)
Total	6	10	16

were 16 patients. Among them, 10 (62.5%) were women and 6 (37.5%) men, ranging in age from 6 to 62 years, with an average age of 31.9 years. From the same table one can see that in 25% of the cases neither patient nor physician could determine the causing plant. Most frequently the cause were figs (18.7%) and weeds (18.7%), then celery and parsley both 12.5%. The patients with photodermatitis were seen in May (3 cases), June (7 cases), July (5 cases) and in September (1 case). The lesions were present on the dorsa of the hands (6 cases), forearms (3), legs (4), face (1 case) and trunk (2 cases).

Females were more frequently affected (2 children and 8 adults), while in males there were 3 children and 3 adults. Among the females the majority were housewives, working in their vegetable gardens. The males were workers on vacation.

Discussion

In all our cases the patients denied the use of photosensitive drugs, but had contact with plants. Phytophotodermatitis can manifest in two clinical forms. First as Berloque dermatitis after the application of eau de cologne or similar perfumes containing oil of bergamot on the skin, followed by exposure to sunlight. The disease was described by Freund in 1916, and is characterized by a bizarre pigmentation resembling a pendant, but he did not recognize the importance of sunlight in the origin of the lesions⁷. Today the disease becomes rarer because the bergamot oil is no more present in perfumes. The second form is dermatitis striata et bullosa pratensis, described first by Oppenheim in Vienna, and characterized by a linear eruption, vesicles, bullas, and subsequent pigmentations⁸. Kičevac also experimented with plants and irradiation, but unfortunately believed it was caused by chlorophyll⁹. It was Kuske who demonstrated that plants causing phytophotodermatitis contain furocoumarins i.e. psoralens¹⁰. Furocoumarins are tricyclic compounds that plants synthesize for the defense of fungi. They can be linear such as psoralens (5-MOP, 8-MOP), or angular like angelicin, pimpinellin, and sphondin which are less photoactive. Their photoactivation leads to damage of the cell membranes and more important to the formation of ad-

ducts with the pyrimidine bases (thymine and cytosine) and consequent DNA damage and cross strand links^{2,11}.

Phytophotodermatitis can happen in vacationers, children, soldiers and other people. Outdoor workers can also develop photodamage by contact with plants: florists, horticulturists, gardeners, farmers, loggers, grocery store workers, food handlers, botanists and others¹². Among our patients about 30% were children playing or hiking in the fields, and among women housewives, working in their kitchen gardens. The disease appeared mostly in the summer months when the concentration of psoralens is highest in the plants.

The most frequent plants causing phototoxic reactions belong to the family apiaceae (formerly umbelliferae)². The individual pickering, or handling plants (cooks) like celery (*Apium graveolens*), parsnip (*Pastinaca sativa*) and parsley (*Petroselinum crispum*), can develop such »harvester's dermatitis«. Phytophotodermatitis develops also after contact and exposure to sun rays by false Bishop's weed (*Ammi majus*), cow parsnip (*Herculeum sphondylium*) that causes trimmer dermatitis, and angelica that is used in Benedictine flavors. Carrot (*Daucus carota*), and fennel (*Foeniculum vulgare*) can sometimes cause phytophotodermatitis². Interestingly, celery infected with the fungus *Sclerotinia sclerotium* (pink rot disease) contains more furocoumarins and is more harmful than the uninfected plant. The fungus can be found also on potatoes, lettuces and other plants¹³.

Members of other families of plants also can cause phototoxic reactions, so in the family rutaceae which contains psoralens and furochinollins there are rue (*Ruta graveolens*) and the pulp and rind of citrus fruits (lemon, lime, bergamot). Limes especially the Mexican limes, which contain high concentration of bergapten, and have been used to prepare »margherita«^{14,15}, can cause phytophotodermatitis. Among the leguminosae, phototoxic reaction can be provoked by *Myroxylon balsamum* and *Psoralea corylifolia*. Furthermore, phototoxic reactions can be induced by plants from the family of moraceae such as figs (*Ficus carica*)^{2,16,17}.

It is important to differentiate phytophotodermatitis from impetigo, child abuse, allergic dermatitis, and from pseudo-phytophotodermatitis caused by contact with plant insecticides and herbicides^{18,19}. Sometimes, the use of certain drugs (sulphonamides, antidiabetics, thiazides, non-steroid anti inflammatory drugs, phenothiazines) or contact with oils, tars can also induce sensitization to solar UV²⁰. Phototoxic and photoallergic dermatitis can also be induced by airborne allergens and irritant substances in the form of solid particles, gases or droplets²¹.

Today the use of »natural« remedies like aromatherapy, phytotherapy or other use of plant extracts for medical or cosmetic purpose can cause phytophotodermatitis.

Conclusion

The exposure of the skin to plants and sunlight can cause phototoxic reactions. The analyses of our patients

with phytophotodermatitis revealed that the majority of the cases were women working in their gardens. The disease develops frequently in children during spring and summer, in sunny days. The culprit have figs, weeds, cel-

ery and parsley. The physicians need to know these possibilities.

REFERENCES

1. PATHAK MA, FITZPATRICK TB, Photochem Photobiol B, 14 (1992) 3. — 2. MCGOVERN TW, Dermatoses due to plants. In: BOLOGNIA JL, JORIZZO JL, RAPINI RP (Eds) Dermatology (Mosby, Edinburgh, 2003). — 3. GRUBER F, LENKOVIĆ M, STAŠIĆ A, ČABRIJAN L, Acta Dermatovenerol Croat, 3 (1995) 49. — 4. MARKS JG, DE LEO VA, Contact and occupational Dermatology (Mosby, St. Louis, 1997). — 5. KLABER R, Br J Dermatol, 54 (1942) 193. — 6. SCHEMPF CM, SCHÖPF E, SIMON JC, Hautarzt, 53 (2002) 93. — 7. FREUND E, Derm Wschr, 63 (1916) 931. — 8. OPPENHEIM M, Arch Derm Syph, 46 (1942) 541. — 9. KITCHEVATZ M, Bull Soc Franc Derm, 40 (1933) 761. — 10. KUSKE H, Dermatologica, 82 (1940) 273. — 11. LEWIS WH, ELVIN-LEWIS MPF, Medical botany (Wiley, New York, 1977). — 12. GRUBER F, PEHARDA V, KAŠTELAN M, BRAJAC I, Acta Dermatovenerol Croat, 15 (2007) 191. —
13. BIRMINGHAM DJ, KEY MM, TUBICH GE, PERONE VP, Arch Dermatol, 83 (1961) 73. — 14. SCHEMPF CM, SCHOPF E, SIMON JC, Hautarzt, 50 (1999) 432. — 15. WAGNER AM, WU JJ, HANSEN RC, NIGG HN, BEIERE RC, Am J Contact Dermat, 13 (2002) 10. — 16. MILAVEC-PURETIĆ V, ZEČEVIĆ J, Acta Dermatovenerol Iug, 10 (1983) 25. — 17. PEHARDA V, GRUBER F, KAŠTELAN M, PRPIĆ-MASSARI L, SAFTIĆ M, ČABRIJAN L, ZAMOLO G, Coll Antropol, 31 (2007) 87. — 18. STONER JG, RAS-MUSSEN JE, J Am Acad Dermatol, 9 (1983) 1. — 19. DE ALMEIDA HL, JORGE VM, Dermatol Online J, 12 (2006) 8. — 20. LUGOVIĆ L, ŠITUM M, OZANIĆ-BULIĆ S, SJEROBABSKI-MASNEC I, Coll Antropol, 31 (2007) 63. — 21. GOOSENS A, Acta Dermatovenerol Croat, 14 (2006) 153.

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FITOFOTODERMATITIS U RIJEČKOJ REGIJI

SAŽETAK

Kontakt sa biljkama može uzrokovati fototoksične i rijeđe fotoalergijske reakcije. Fototoksični dermatitis (phytophotodermatitis) javlja se nakon dodira ili ingestije biljke koja sadrži furokumarine (i.e. psoralene) uz izlaganje suncu. Kožne lezije razvijaju se unutar 24–48 sati i karakterizirane su eritemom, bulama, pečenjem ili boli, te su praćene hiperpigmentacijama dužeg trajanja. Furokumarini mogu biti linerani, i.e. psoraleni (5-MOP, 8-MOP), ili angularni kao što je angelicin i pimpinellin. Njihovo vezanje na DNA uzrokuje stanično oštećenje. Zanimanja visokog rizika za razvoj fitofotodermatitisa su cvjećar, vrtlar, poljoprivrednik, agronom, prehrambeni radnik i botaničar. Biljke koju uzrokuju fitofotodermatits mogu biti dio lokalne flore, ali su obično članovi porodice apiaceae (prije poznate kao umbelliferae), rutaceae, leguminosae i moraceae. U ovome radu istraživani su fitofotodermatitisi koji su se pojavili u proljeće i ljeto u periodu od tri godine.