

Allergic contact dermatitis caused by neem oil

Danielle T. Greenblatt, Piu Banerjee and Jonathan M. L. White

St John's Institute of Dermatology, Guy's and St Thomas' NHS Foundation Trust, London SE1 7EH, UK

doi:10.1111/j.1600-0536.2012.02099.x

Key words: allergic contact dermatitis; azadirachtin; neem oil.

Neem oil is extracted from seed kernels of the tree *Azadirachta indica*, which grows prolifically throughout South Asia. The word 'neem' derives from the Sanskrit 'nimba', meaning 'bestower of good health'; the medicinal benefits of Neem are explored in Ayurvedic texts. Apart from traditional medicinal and cosmetic usage, neem is employed today as a botanical pesticide, insect repellent, and fertilizer (1). We present a rare case of allergic contact dermatitis caused by neem oil.

Case Report

A 56-year-old female presented with an eczematous eruption of 6 weeks' duration. This had begun on the right breast as an erythematous plaque, with spread to the arm. In the days preceding the rash, the patient had treated a furuncle on the breast with a self-made poultice containing neem and tea tree oils (Fig. 1).

She was patch tested using Finn Chambers® on Scanpor tape® with occlusion for 2 days. She was tested with an extended European baseline series, a cosmetic and essential oil series (including tea tree oil), her own lavender/aloe vera deodorant, and her own neem oil (tested 'as is'). Readings were made according to International Contact Dermatitis Research Group criteria. The only positive reaction was a 2+ reaction to neem oil on D4;



Fig. 1. Patient's bottle of neem oil.

there was no reaction on D2 (Fig. 2). We interpreted this as allergic contact dermatitis. Serial dilutions were not performed; however, 5 volunteer control subjects were tested with the same neem oil on D2 and D4, with the same testing methodology as used for the patient. These controls had no prior exposure to neem oil, and testing gave negative results at D2 and D4.

Correspondence: Dr Danielle T. Greenblatt, St John's Institute of Dermatology, Guy's and St Thomas' NHS Foundation Trust, London SE1 7EH, UK. Tel: +44 20 71881613; Fax: +44 20 71887473. E-mail: daniellegreenblatt@doctors.org.uk

Conflicts of interest: The authors have declared no conflicts.



Fig. 2. Neem oil tested 'as is' on D4.

Discussion

More than 140 compounds have been isolated from the neem plant, several of which have confirmed biological activity, as tested *in vitro*, including anti-inflammatory, antibacterial and antiproliferative effects (1).

The first case report of contact allergy to neem was described by Hamamoto in 2000 (2). Here, a 35-year-old man used a neem-containing topical herbal psoriasis treatment for 5 weeks. After an initial improvement in his psoriasis, the patient developed a superimposed eczematous dermatitis. Patch testing gave positive results with neem oil at concentrations between 1% and 10%, but negative results with all other herbal constituents. Although serial dilutions were used, there was no information on test methodology, and it is unclear whether controls were tested.

In 2008, Reutemann reported on a 27-year-old female who presented with ear and facial dermatitis, following the use of 100% pure neem oil for the intended treatment of alopecia areata. Patch testing at the D4 reading showed a strongly positive reaction to pure neem oil, with lesser reactions to fragrance mix I and imidazolidinyl urea. In this case, no controls or serial dilutions were used, so it is unclear whether this case represents a true allergic contact dermatitis or an irritant phenomenon (3).

The allergen in neem oil responsible for sensitization is unknown. The process of oil extraction from the seed varies, and this may alter the concentrations of isolates. For example, oil rich in the triterpenoid compound azadirachtin provides the greatest pesticidal activity, but is irritant. For cutaneous use, natural seed oil is treated with alcohol to remove azadirachtin.

Animal studies showed that guinea pigs shaved and patch tested with neem oil for 6 hr every other day for a total of nine applications did not develop contact sensitization (4).

Possible allergens in neem oil include triterpenoid compounds (such as azadirachtin and nimbin) and coumarins. The presence of contaminants should also be considered. Autoxidation of oil compounds upon air exposure may be a further mechanism whereby allergenic oxidation products are formed, as has been reported with other plant oils (5).

Neem oil products labelled as insect repellants are regulated in the United Kingdom. However, the medicinal and other uses of neem oil remain unregulated. In view of the growing use of alternative medicine and internet-based self-medicating practices, allergic contact dermatitis caused by herbal treatments and essential oils may become more prevalent.

References

- 1 Brahmachari G. Neem – an omnipotent plant: a retrospection. *Chembiochem* 2004; **5**: 408–421.
- 2 Hamamoto Y, Nagai K, Yasui H et al. Cutaneous drug reaction case reports: from the world literature. *Am J Clin Dermatol* 2000; **1**: 317–322.
- 3 Reutemann P, Ehrlich A. Neem oil: an herbal therapy for alopecia causes dermatitis. *Dermatitis* 2008; **19**: E12–E15 (Review).
- 4 National Research Council Board on Science and Technology for International Development. *Neem: A Tree for Solving Global Problems*, Washington, DC, National Academies Press, 1992; pp. 23–70, 100–103.
- 5 Sköld M, Hagvall L, Karlberg A T. Autoxidation of linalyl acetate, the main component of lavender oil, creates potent contact allergens. *Contact Dermatitis* 2008; **58**: 9–14.