

Thymoquinone as a causative allergen in nigella sativa oil contact dermatitis with cross reactivity to t-butylhydroquinone

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Thymoquinone (TQ), the main constituent of *Nigella sativa* L. oil (NSO) , was investigated for therapeutic uses in different diseases for its antioxidant, anti-inflammatory, antiproliferative and proapoptotic properties¹. Several cases of allergic contact dermatitis (ACD) and bullous eruption to NSO have been published and the hypothesis of TQ being the causative substance was suggested but not confirmed²⁻³. We report a case of ACD caused by NSO with a positive patch test to TQ.

Case report

A 46-year-old woman presented with a 2-week history of eczema of the scalp, face and shoulders. For androgenic alopecia, she had bought NSO on the market and applied it on the scalp, once a day

for the last 2 months. Eczema improved with topical steroids and NSO discontinuation. Patch tests were performed with the European baseline, a cosmetic and a fragrance series (Chemotechnique Diagnostics, Vellinge, Sweden). Open tests with the NSO 10% pet. used by the patient and patch test with TQ 0.1% ethanol were performed with readings at day (D) 2 and D4. Strong or extreme positive patch test reactions were observed to NSO (++)/++), *t*-butylhydroquinone (TBHQ) (++)/++ (in the cosmetic series), carvone (++)/++), amyl cinnamal (-)/++), and TQ (+++)/+++ (fig 1).

Discussion

The main components of the NSO are TQ, *p*-cymene, carvacrol and *t*-anethol⁴. At 0.1% in ethanol, patch testing with TQ was not irritant in one control subject and 6 others previously published⁵. To our knowledge, TQ had never been tested in case of ACD to NSO. This TQ-positive patch test demonstrates that TQ could be one of the allergens in NSO. A positive TBHQ patch test, a structurally related synthetic reduced quinone⁶ (fig. 2), could be a marker of TQ allergy. Concerning others positive patch tests, carvone has been found in some NSO, whereas amyl cinnamal was not. However, *trans*-2-hydroxycinnamic acid and *trans*-hydroxycinnamic acid, amyl cinnamal derivatives were found in both the shoot and the roots of *Nigella sativa*⁷. This multiple sensitization could be explained by *p*-cymene that acts as a natural transdermal permeation enhancer⁸. Unfortunately, the composition of the NSO which had been used by the patient could not be analyzed.

In conclusion, for the first time TQ was tested in a case of ACD to NSO with a strong positive reaction, strongly suggesting that TQ is one of the allergens of NSO. In order to confirm these results, in case of sensitization to NSO, patch testing with TQ, TBHQ, carvone and amyl-cinnamal could be recommended.

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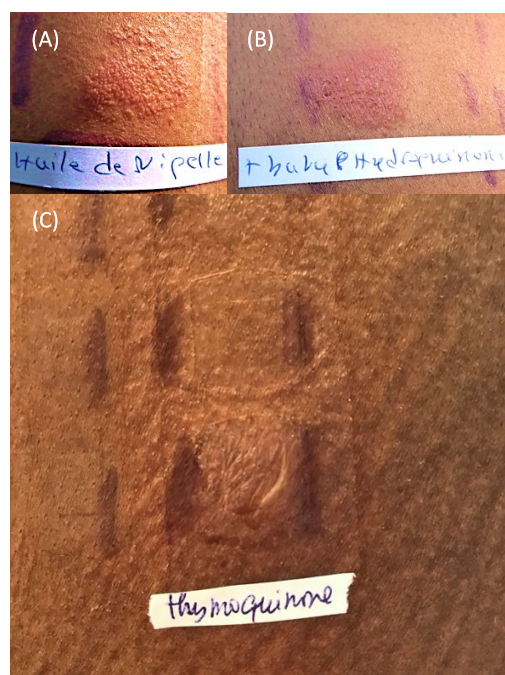
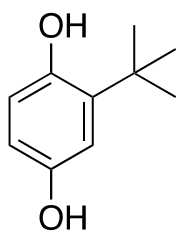
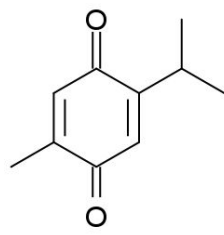


Figure 1: at day 2, positive (A) open test to *Nigella sativa* oil, (B) patch test to *t* butyl hydroquinone and (C) patch test to thymoquinone.



t-butyl hydroquinone



thymoquinone

Figure 2: chemical formula of *t*-butyl hydroquinone and thymoquinone