

Eyebrow allergic contact dermatitis caused by *m*-aminophenol and toluene-2,5-diamine secondary to a temporary black henna tattoo

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Eyebrow dyeing products are becoming increasingly popular. Consequently, allergic contact dermatitis (ACD) in these anatomical areas has become an emerging problem over the last decade. *p*-Phenylenediamine (PPD) and its derivatives are the most common allergens in eyelash and eyebrow dyes.^{1,2} However, ACD of the eyelashes and eyebrows caused by toluene-2,5-diamine (TDA) has rarely been reported.

CASE REPORT

A 28-year-old woman came to our dermatology department with a severe eczematous reaction on the eyebrows (Figure 1) 1 day after contact with an eyebrow dyeing cream (Refectocil No. 3; Naturbraun Gschwenter Haarkosmetik, Leopoldsdorf, Austria) (ingredients: aq., cetearyl alcohol, TDA, bis-diglyceryl-polyacetyl-adipate-2, PEG-40 hydrogenated castor oil, sodium cetearyl sulfate, *m*-aminophenol, sodium laureth sulfate, CI 77491, CI 77492, and CI 77499) applied by her beautician. The patient reported extreme burning and itching, and erythema, swelling and exudation were clinically evident. The patient had never used hair dyes, but she had had a black henna tattoo applied on her forearm 14 years previously. She had developed an intense vesicular reaction 15 days after the tattoo application.

In the present case, after complete resolution of the dermatitis, obtained in 2 weeks with once-daily application of mometasone furoate and once-daily administration of 5-mg levocetirizine tablets, we performed patch tests with the Italian Society of Allergological, Occupational and Environmental Dermatology (SIDAPA) baseline

series (Euromedical, Calolziocorte, LC, Italy), the eyebrow agent employed on the patient (Refectocil No. 3) 10% pet., *m*-aminophenol, and TDA. The patch tests were applied on the back, and left under occlusion for 2 days by use of the AI Test (Euromedical) technique on Scanpor tape (Norgesplaster, Vennesla, Norway); readings were performed on day (D) 2 and D4. Reactions were read according to ESCD



FIGURE 1 Severe eczematous reaction on the eyebrows of the patient 1 day after contact with an eyebrow dyeing cream

guidelines.³ Positive reactions were observed on D2 and D4 to PPD 1% (+++), nickel (++), textile dye mix (++), Refectocil No. 3 10% pet. (+ +), TDA (++), and *m*-aminophenol (++). Hence, we performed patch tests with the azo dye mix series, and this showed positive reactions to Disperse Orange 3 (+++), Disperse Orange 1 (++), and Disperse Yellow 3 (++).

DISCUSSION

We report a case of eyebrow ACD caused by TDA and *m*-aminophenol contained in an eyebrow dye, in a patient who was probably sensitized to PPD through a black henna tattoo. The patient showed positive patch test reactions to the tinting agent TDA, *m*-aminophenol, PPD, and azo dyes.

ACD following the application of dyes to eyelashes and eyebrows is being increasingly observed. The first case of eyebrow contact dermatitis caused by an eyebrow dye was induced by pyrocatechol, as reported by Andersen in 1988.⁴ Subsequently, 2 cases caused by 2-chloro-phenylenediamine and PPD were described.^{1,2}

Henna tattoos are becoming very popular. Red henna, which is an orange pigment extracted from *Lawsonia inermis*, is usually mixed with different ingredients, above all PPD, in order to darken the henna paste and to make it last longer. PPD is added to henna tattoos in unknown concentrations, and so it may cause sensitization.⁵ Once sensitized, patients may experience severe forms of allergic ACD caused by all PPD derivatives. In our patient, the first manifestation of sensitization to PPD and its derivative occurred after the use of eyebrow dyes containing *m*-aminophenol and TDA. The latter is less sensitizing than PPD,^{6,7} and so is commonly used as an alternative for hair dyes in PPD-sensitized patients.⁸ Nevertheless, a cross-reaction between TDA and PPD has been described,³ in particular in patients strongly sensitized to PPD (as usually occurs after temporary henna tattoos);⁹ therefore, patients who are allergic to PPD should also avoid products containing TDA.

Conflict of interest

The authors declare no potential conflict of interests.

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REFERENCES

1. Teixeira M, de Wachter L, Ronsyn E, Goossens A. Contact allergy to para-phenylenediamine in a permanent eyelash dye. *Contact Dermatitis*. 2006;55:92-94.
2. Hansson C, Thorneby-Andersson K. Allergic contact dermatitis from 2-chloro-p-phenylenediamine in a cream dye for eyelashes and eyebrows. *Contact Dermatitis*. 2001;45:235-236.
3. Johansen JD, Aalto-Korte K, Agner T, et al. European Society of Contact Dermatitis guideline for diagnostic patch testing—recommendations on best practice. *Contact Dermatitis*. 2015;73:195-221.
4. Andersen KE, Carlsen L. Pyrocatechol contact allergy from a permanent cream dye for eyelashes and eyebrows. *Contact Dermatitis*. 1988;18:306-307.
5. Panfili E, Esposito S, Di Cara G. Temporary black henna tattoos and sensitization to para-phenylenediamine (PPD): two pediatric cases and review of the literature. *Int J Res Public Health*. 2017;14:421.
6. S¸st¸ed H, Basketter DA, Estrada E, Johansen JD, Patlewicz GY. Ranking of hair dye substances according to predicted sensitization potency—quantitative structure–activity relationships. *Contact Dermatitis*. 2004;51:241-254.
7. S¸st¸ed H, Agner T, Andersen KE, Menn¸ T. 55 cases of allergic reactions to hair dye: a descriptive, consumer complaint-based study. *Contact Dermatitis*. 2002;47:299-303.
8. Vogel TA, Heijnen RW, Coenraads PJ, Schuttelaar MA. Two decades of p-phenylenediamine and toluene-2,5-diamine patch testing—focus on co-sensitizations in the European baseline series and cross-reactions with chemically related substances. *Contact Dermatitis*. 2017;76:81-88.
9. Kind F, Scherer K, Bircher AJ. Contact dermatitis to para-phenylenediamine in hair dye following sensitization to black henna tattoos—an ongoing problem. *J Dtsch Dermatol Ges*. 2012;10:572-578.

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