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To cite this article: Hakan Turan, Mesut Okur, Ertugrul Kaya, Emrah Gun & Cihangir Aliagaoglu (2013) Allergic contact dermatitis to para-phenylenediamine in a tattoo: a case report, Cutaneous and Ocular Toxicology, 32:2, 185-187, DOI: [10.3109/15569527.2012.709570](https://doi.org/10.3109/15569527.2012.709570)

To link to this article: <http://dx.doi.org/10.3109/15569527.2012.709570>



Published online: 22 Aug 2012.



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CASE REPORT

Allergic contact dermatitis to para-phenylenediamine in a tattoo: a case report

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Abstract

It is highly popular among children and young adults to have temporary henna tattoos on their bodies in different colors and figures. Henna is a greenish natural powder obtained from the flowers and dry leaves of *Lawsonia alba* plant and its allergenicity is very low. Henna is also used in combination with other coloring substances such as para-phenylenediamine in order to darken the color and create a permanent tattoo effect. Para-phenylenediamine is a substance with high allergenicity potential and may cause serious allergic reactions. Here, we aimed to draw attention to the potential harms of para-phenylenediamine containing temporary tattoos by presenting a child patient who developed allergic contact dermatitis after having a scorpion-shaped temporary tattoo on his forearm.

Keywords: Allergic contact dermatitis, henna, para-phenylenediamine, tattoo

Introduction

In recent years, in Turkey and around the world, it has become quite popular to have temporary henna tattoos in different colors and figures on their bodies especially among children and young population. Henna is a greenish natural powder obtained from the flowers and dry leaves of *Lawsonia alba*, a plant that contains lawsone as the active ingredient (1). Lawsone is a naphthoquinone and has a low allergenicity potential. However, cases of allergic contact dermatitis have been reported due to pure henna (2). Henna may be used alone, or it may be combined with other coloring substances such as para-phenylenediamine (PPD), in order to accelerate drying, darken the color, and create a permanent tattoo effect (3). Also, tattoo mixtures may contain other additives like oils, rubber products, azo dyes, and heavy metals such as nickel and cobalt (4). The mixture of henna and PPD is commercially called as “black henna.” Para-phenylenediamine is a substance with high allergenicity potential and may cause serious allergic reactions. Here, we present a child patient who developed severe and

disseminated allergic contact dermatitis due to a temporary tattoo with black henna.

Case

An 11-year-old male patient presented to our outpatient clinic with a one-day history of sudden onset swelling and pruritus of his left forearm. He received a scorpion shaped temporary tattoo on his forearm with black henna within the 24h prior to developing the rash. He previously had received a temporary tattoo on his right shoulder with black henna and developed a mild eczematous reaction on the procedure site within about 2 weeks following the procedure. There was no additional peculiarity in his personal and family history. His systemic physical examination was normal. On the dermatological examination, a sharply demarcated, livedoid-colored, pruritic scorpion-shaped plaque containing many vesicles, bullae and yellowish crusta was detected on his left forearm (Figure 1). There were satellite papules and papulovesicles around the lesion, on the trunk, and also the face (Figure 2). The patient was diagnosed as allergic

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(Received 06 June 2012; revised 28 June 2012; accepted 03 July 2012)



Figure 1. Sharply demarcated, pruritic scorpion-shaped plaque containing many vesicles, bullae and yellowish crusta on his left forearm.



Figure 2. Papules, papulovesicles involving the face and neck.

contact dermatitis based on the anamnesis and clinical findings. He was recommended to have 16 mg daily dose of oral methylprednisolone for one week, antihistamine and midpotent topical corticosteroid therapy for the disease. The lesion regressed in 10 days, leaving a postinflammatory hyperpigmentation. One month later, a European standard series patch test was performed and potent reaction was detected against PPD at the hours 48 and 96.

Discussion

Para-phenylenediamine is a component of black dyes used for coloring the hair and skin, and it is a potent allergen. The prevalence of allergic reactions to PPD in

the general population is estimated to be 1% (5). In their study, Almeida et al. (6) have found a clinical correlation between age and the source of sensitization to PPD. According to this, the source of sensitization in older age groups is contact with hair dyes as a professional or home user while it is henna tattoos in children. Adverse reactions with PPD are generally observed as type IV delayed hypersensitivity; however, serious adverse effects such as contact anaphylaxis, renal failure, and acute respiratory insufficiency have been reported after the topical application of the dyes containing PPD (7–9). The most common clinical pattern of PPD allergy is allergic contact dermatitis on the scalp, forehead and face following the use of hair dyes (10). In case of a new antigen contact, allergic contact dermatitis develops after an incubation period of about 7–10 days. This period is generally necessary for active sensitization (11). In the present case, a very short development period of the reaction is probably associated with the previous sensitization to PPD during the earlier temporary tattoo application.

In many countries, there is no legal limit specified for the PPD ratio in the dyes. The European Economic Community has determined the upper limit of PPD in dyes as 6% (12). However, henna tattoos generally contain 15–30% PPD illegally and this concentration is the major cause of the serious sensitization (13).

Para-phenylenediamine is a precursor of azo dyes. Except henna textiles, leather, rubber products, plastics, oils, petrol, adhesive covers, printer inks, pens, shoes, foot creams, and certain cosmetics may also involve PPD itself or its cross-reacting allergens like azo dyes (14,15). As one can see from that, PPD is involved in many substances we commonly use in our daily lives. Children may develop contact sensitization to temporary tattoo applications, and it may last a lifetime. This condition may affect their daily lives and business lives negatively in subsequent years. Furthermore, it should be taken into consideration that PPD may cause reactions serious enough to threaten life. We are of the opinion that the awareness of children, young people and families about this subject should be increased by campaigns and advertisements; and using PPD in temporary tattoos must be prevented through legal remedies.

Declaration of interest

The authors declare no conflict of interest.

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