

## Report of two pediatric cases of allergic contact dermatitis induced by temporary henna tattoos.

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### Summary

In the last few years, the henna tattoo fashion has widely spread throughout the Western countries. We report two cases of allergic contact dermatitis observed in children after paint-on henna tattoo procedures. The patients came to our outpatients' clinic for the onset of erythematous and edematous, pruriginous lesions where the skin had been tattooed 3 weeks before. Treatment with topical steroids and systemic antihistamines led to the regression of the symptoms. Later, European Standard Series Patch Tests were positive in both cases for para-phenylenediamine (PPD) at 1%. We point out the young age of our two patients (7 years) and the need to inform the public on the risks of this sensitization, due to the widespread custom of this procedure.

### Key words

Allergic contact dermatitis, children, temporary tattoo, henna.

The "art" of decorating hands and feet with henna dyes is widely used by Arabs, Africans and Indians, as a traditional custom on special occasions, such as wedding parties and public celebrations. This method, often carried out by tourists who visit these places, is rapidly spreading throughout the Western world.

Henna is a dark-green powder obtained from the leaves and the trunk of *Lawsonia inermis* or *Lawsonia alba* plants belonging to the Lythraceae family, that are mainly cultivated in countries with a warm-humid climate. When this derivative is mixed with water or oil it becomes a paste that, if applied for several hours on skin and hair, produces a typical orange-brown coloration.

It is actually employed in the field of cosmetics as a dye, in shampoos, as a conditioner and in other hair products.

The active ingredient, called Lawsone, namely 2-hydroxy-1,4-naphthoquinone (12), is also employed in anti-UVA sun-protection creams in combination with 1,3-dihydroxyacetone (26), evidences an antimycotic and tuberculo-static activity in mice (22), and, in addition, can determine an oxidative hemolysis in G6PDH deficient subjects (2,19).

Henna products in commerce are often mixed with other compounds, such as tea leaves, coffee powder, charcoal powder and lampblack, lemon oil, eucalyptus oil, and other "secret" formulas (8). Moreover, other substances are added to dyes used on hair and for temporary tattoos, such as para-phenylenediamine (PPD), to reduce the time of application and to obtain a darker and brilliant shade of brown.

In the last few years, henna painting has become increasingly popular and it tends now to be done also on our beaches, often by people who

turn themselves into tattooists. The major awareness of the risks linked to permanent tattoos and the belief that henna tattoos have no inconveniences due to their short duration, are factors that are surely encouraging this custom.

### Case report

*Case n. 1.* A 7-year-old girl was examined at our outpatients' clinic for the development of a purplish erythematous and edematous lesion covered with vesicular lesions, localized on the dorsal side of her right forearm (Fig. 1). Twenty days before, the girl had a temporary henna tattoo applied in an Italian seaside resort, featuring two dolphins that faded away after 10 days. After about 1 week, a bright-red erythematous, edematous and vesicular reaction developed on the same spot, intensely itchy, with regular margins that reproduced the figure of the tattoo. After the application of topical steroids (budesonide, two applications/day) and oral antihistamines (oxatomide) for 10 days, the lesion regressed completely. Then the patient underwent

European Standard Series (ESS) patch tests that were positive for PPD at 1% (++).

*Case n. 2.* A 7-year-old girl developed an erythematous cutaneous reaction, covered by whitish scales and crusts on the right deltoid region that reproduced the image of a dolphin and a sun (Fig. 2). On the same spot, a temporary henna tattoo was applied a month earlier in an Italian seaside resort. It spontaneously faded away in 10 days. After two weeks an erythematous and itchy lesion developed that had exactly the same shape of the tattoo applied. Later, exuding papulovesicular elements appeared with a crusty evolution. The patient was treated with topical steroids (budesonide, two applications/day) and with oral antihistamines (oxatomide) for 10 days, until the disorder cleared completely. ESS patch tests after three weeks were positive for PPD at 1% (++).

### Discussion

The results of epicutaneous allergometric tests showed that the patients were affected by an



Fig. 1



Fig. 2

Fig. 1, 2: Erythematous and exudating lesions in site of temporary henna tattoo featuring two dolphins (Fig. 1). In Fig. 2 squamous and crusted lesions in site of temporary henna tattoo featuring a dolphin and a sun.

allergic contact dermatitis (ACD) triggered by PPD. None of the two patients made any mention of previous employment henna, but it is evident that PPD is a widespread allergen and therefore the risk of developing a sensitization towards this substance is quite high. In 1966, Kligman calculated that a single 1.0 ml-application of a 10% solution of PPD on the forearm could sensitise approximately 80% of the population (5).

The unusual intensity of the reaction following only one contact with the sensitising agent might be due to the fact that ACD in our patients was triggered by an active sensitisation towards the preparation, perhaps for the high concentration of PPD or probably for a cross-reaction with other sensitizing components in the mixture.

The immediate reactions of hypersensitivity towards henna are frequent and are usually reported in cases of occupational exposure or for cosmetic purposes, giving rise to symptoms such as urticaria, angio-oedema and asthma (1, 10, 16). Literature studies about 31 cases of children staying in a Hospital of Khartoum (Sudan) over a period of 5 years were reported. The symptoms of these children were initially characterised by a massive oedema on the face, lip, glottis, pharynx, neck and bronchi, that developed a few hours after contact with a mixture of henna and para-phenylenediamine -PPD- (3).

Delayed hypersensitivity reactions due to henna tattoos were instead rarely described, especially in pediatric age (4, 7, 13, 14, 15, 21, 27).

In the geographical areas where henna is widely employed, until now only a few cases of ACD (17) have been observed notwithstanding approximately 50% of the population is exposed to this substance. ACDs triggered by Lawsone are extremely rare, whereas the main cause of this reaction appears to be the presence of PPD in the product (6, 8, 9, 11, 18, 20, 23, 24, 25).

PPD has various applications, both in the industrial and the domestic fields, mainly permanent dye for hair, hides and furs and in the manufacture of black rubber. In addition, this substance cross-reacts with a number of structurally correlated compounds that, like PPD, con-

tain an amine group in the para position of their benzene ring, as sunscreens, drugs (sulphonamides, sulphanyl-ureas and dapsone), nitrogenous dyes, local anaesthetics, and some chemical agents used for photographic development and in lithographic and photocopying procedures.

The employment of PPD and of other diaminobenzenes (o-diaminobenzenes, m-diaminobenzenes e p-diaminobenzenes) is legal in the Countries of the European Community for hair dyes at a maximum concentration of 6%, whereas its employment is prohibited in products for colouring eyelashes, eyebrows and skin. For this reason, the concentration of PPD has been reduced from 2% to 1% also in patch tests, in order to avoid inducing sensitization when carrying out these tests (6).

Instead, in the dyes used for temporary tattoos there are no regulations concerning the employment of PPD and its by-products, which are often added to such products in concentrations higher than the ones authorized. Moreover, the absence of an oxidizing agent, such as hydrogen peroxide that neutralizes PPD itself, determines a major contact between the skin and this substance, thus increasing the risk of an active sensitization of the skin and consequentially an allergic contact reaction (18).

Henna tattoos are becoming increasingly popular in the Western culture, especially among the youth as an alternative to permanent tattoos. Moreover, they are quickly available and at the low costs of street vendors or with "do-it-yourself" packets, without facing any pain and for a mean duration of 1-3 weeks.

However, even if temporary tattoos are safer than the permanent ones, especially for the risk of contracting infectious diseases, they must not be considered as completely innocuous. In fact, they may account for toxic and allergic reactions, even in children, on which only few cases have been reported, but that a dermatologist has to bear in mind.

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