

## Temporary Tattoo Associated Type IV Delayed Hypersensitivity Dermatitis in a Child – A Case Report and Call for Parental Caution in Singapore

### Dear Editor, Case Report

A 5-year-old, previously healthy French Caucasian boy was seen at a Paediatric Emergency Department for a skin rash over his left forearm.

The child had a temporary “black scorpion” tattoo painted on his left forearm while in Singapore. The temporary tattoo disappeared after a few days. However a week later, the parents noted that the skin erupted in an erythematous papulovesicular lesion which was in the shape of the scorpion tattoo (Fig. 1).

The following lesion was observed.



Fig. 1. Photograph of patient's papulovesicular lesion which was in the shape of the applied temporary tattoo.

The child had complained of intense pruritus but minimal pain. There was no associated prior history of atopy, eczema or any allergic reactions. The parents were extremely distraught about the adverse reaction and were ridden with self-guilt. The child was treated with topical 0.1% Betamethasone valerate with 2% fusidic acid and antihistamines for the pruritus.

As the child was due to leave Singapore and would be returning back to France, he was referred for follow-up with a French paediatric dermatologist. This was a typical Type IV Delayed Hypersensitivity reaction. In addition,

Paraphenylenediamine (PPD) is a black pigment which can be found in temporary tattoos and was the most likely causative agent for the hypersensitivity reaction.

### Discussion

Henna is often used in temporary tattoos especially in product, and reported allergic reactions are rare.<sup>1</sup> Natural henna imparts a brownish-orange pigment to the skin when applied and takes several hours to dry and fix to the skin.

However, to simulate the black colour of real tattoos and hasten the drying time, a contemporary technique involves adding PPD. The combination of PPD and henna is often marketed as “black henna.”

Paraphenylenediamine (PPD) is a potent T-cell stimulator and patch testing of patients with PPD allergy will show a reaction consistent with a type IV delayed hypersensitivity reaction.<sup>2</sup> PPD's potency as an allergen is directly related to the concentration and duration of direct exposure.

PPD is also often used in hair dyes. As most hair dyes contain less than 6% PPD and contact with the scalp or skin is usually less than 30 minutes, its use as a hair dye has been fairly safe. However, black hair dyes with PPD is not an uncommon cause of contact dermatitis in hair dressers due to prolonged contact and sensitization.<sup>3</sup>

Epidemiological studies on PPD allergy has been reported to be similar despite possible genetic patient variations: 4.3% in Asia, 4% in Europe and 6.2% in North America.<sup>4</sup>

In temporary tattoos, however, tattoo inks have been found to have PPD concentrations as high as 15% to 30%.<sup>2</sup> Moreover, the contact with skin is usually prolonged (in days instead of minutes). The temporary tattoo associated type IV hypersensitivity dermatitis secondary to PPD typically occurs after 3 to 10 days after the temporary tattoo application. If a patient has been previously sensitised to PPD, the reaction can occur more acutely.<sup>5</sup>

Contact dermatitis secondary to temporary tattoos with PPD may result in serious dermatological inflammation and scarring.<sup>5-7</sup> Characteristically, such inflammatory changes follow the shape of the tattoo as exemplified by the case report. However, the hypersensitivity reaction may result in permanent scarring, keloid formation and post-inflammatory pigmentary changes. Post-inflammatory hypopigmentation has been reported to be more frequent in children.<sup>6,7</sup> In addition,

tion, there is the potential for patients sensitised to PPD to have future allergic intolerance of dyes in hair products, rubber chemicals, inks and textile dyes and to some anti-hypertensive medications (e.g. hydrochlorothiazide) and diabetes medication (e.g. sulfonylureas).<sup>8-10</sup>

In the Singapore context, tattoos were previously frowned upon due to their association with triads and secret societies. With increasing exposure to pop culture and greater social acceptance especially amongst the young, tattoos are increasingly seen as symbols of self-expression and even as an art form. Body decoration with temporary tattoos has become a very popular alternative to the traditional, permanent tattoo which involves pain, needles (risk of infection), cost and need for expert application. The use of temporary tattoos which avoids all these especially among teenagers and young adults is on the rise. Similarly, younger children are likewise putting on temporary tattoos for “fun” and for social events like themed parties and during celebrations. What is less well-known to the Singaporean public and especially parents are the potential dire consequences of children putting on temporary tattoos with PPD and in the worst case scenarios on their faces.

Worldwide, there have been an increasing number of reports of temporary tattoo associated dermatitis especially in children.<sup>6,7</sup> The journal, *Dermatitis*, official journal of the American Contact Dermatitis Society (ACDS), named Paraphenylenediamine (PPD) as the “Allergen of the Year” in 2007. The American Food and Drug Administration (FDA) and European Union countries have restricted PPD for human use as a hair dye and explicitly not permitted its use as a skin product. Canadian health officials have gone a step further and outlawed PPD for skin use. However, in Asia, including Singapore, such cautions for temporary tattoos containing PPD especially in children are not well known or publicised.

## Conclusion

Healthcare workers should be aware of such hypersensitivity reactions to temporary tattoos. It is pertinent that the informed public, especially parents, know that temporary tattoos containing PPD should be highly discouraged and avoided especially in children.

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