

Henna Tattoos and Present Day Dangers

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ABSTRACT

Henna tattooing is an ancient skin adornment custom that has recently gained popularity as a temporary and painless alternative to permanent tattoos. While pure henna is relatively safe, the vast majority of modern temporary tattoos have the additive p-phenylenediamine (PPD), a highly sensitizing compound. With the increasing popularity of temporary tattoos, the purpose of this editorial is to explore this epidemic and the skin complications that have skyrocketed to epidemic proportions in its wake.

Key words: Henna tattoo; Contact dermatitis; PPD; paraphenylenediamine

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INTRODUCTION

Henna is a green powder extract derived from the leaves of the *Lawsonia inermis* plant indigenous in North Africa, the Middle East and India. Henna leaves have a dye *lawsome* which readily penetrates the keratin of skin, hair and nails. It was used for medicinal and decorative adornment of skin, hair and nails in ancient history. Henna's use for adornment is over 500 years old, imparting an orange pigment when applied to skin, hair or nails. Its use in ritual, such as Wedding ceremony has existed for centuries in Indian, Algerian, Pakistani, Tunisian and Turkish cultures. Henna was also applied to the hair mummies in Egypt as a method of "youth preservation" as deep brown and red staining is observed after a maturation period of three days post application. Natural Henna has no enhancement aside from a liquid base, such as molasses or lemon juice, to facilitate the adhesion of henna to skin or hair. Some cultures have also implemented use of Neutral Henna, which is in actuality not Henna, but rather an extract of *Senna Italica*, a different plant which yields a yellow color stain as opposed to the red-brown stain of Natural Henna. No health hazards have been reported with this substitution. The main risk with Natural Henna is its use in those with Glucose-6-phosphate dehydrogenase (G6PD) deficiency^[1]. Despite this, Natural Henna application is considered relatively safe, but it does not stain the skin darkly or efficiently, which has limited its popular use.

THE HOAX OF BLACK HENNA

Since the early 70's, temporary tattoos or pseudotattoos or black henna body art has evolved in the modern day and become very popular recreationally for children and adults. These black henna tattoos popularity stems from the much more intense color and quick drying process as compared with traditional henna tattoos (Figure 1). However, black henna is a hoax, modified by an adulterant paraphenylenediamine (PPD) that is added or sometimes

even replacing traditional henna, which produces faster and darker pigment. The most frequent cause of sensitization in exposure to henna tattoos is the adulterating PPD. Because PPD is readily available as a hair dye since 2011, the use of PPD as an additive or to replace henna became almost universal worldwide for tattoo tourism^[2]. PPD sensitization from temporary henna tattoos is now considered a global epidemic^[2].

SKIN REACTIONS TO PPD

PPD is a mutagen thought to promote antigenicity through oxidative damage to keratinocytic DNA^[3]. It has been found that oxidative stress from reactive oxygen species (ROS) may play an important role in the pre-immunological phase of allergic contact dermatitis to PPD^[4]. PPD is one of the most powerful skin allergic sensitizers, with topical application of 10% PPD shown to cause contact allergy in 100% of subjects within 5 applications^[5]. Similarly, about 40% of hair dye allergy has been linked to PPD sensitivity^[6]. Positive skin patch test to PPD can remain positive for over a month, which is unusual and another indicator of the intense sensitization^[7].

Patch testing studies have shown contact sensitizations rates to black henna ranges from 2.5% to as high as 4.7% at an average age of 12^[8] for those sensitized by tattoos. This is a much higher rate of sensitization than has been reported in the general population (0.8%), and has been shown to correlate with lifetime black henna tattoo exposure^[9]. PPD cross reactors include sulfonamide, para-amino benzoic acid or benzocaine^[10,11]. Contact with these substances can cause cross-reactive allergic reactions.

The most common skin reactions to PPD are eczematous, vesicular or lichenoid. Black henna tattoos can cause such severe and acute hypersensitivity reactions that can result in blistering and scarring^[12]. Rarely, temporary black henna has also been reported to cause erythema multiforme, angioedema and localized hypertrichosis, independent of contact sensitization^[13,14]. Henna shops or kiosks currently in operation utilize black henna most often without warning consumers of potential risks. Consumers can recognize adulterated henna by its fast action (with stain appearing within ½ hour of application). Rashes may not occur on first exposure, but certainly can. Most rashes occur acutely (within 12 hours) due to high concentrations of adulterants being added by vendors. Severe blistering reactions are possible and may require dermatologic topical or even systemic treatment with steroids or antihistamines to avoid long term discoloration and scarring.

Use of PPD on hair has been grandfathered in as government policy. As a result of this legal policy, PPD enhanced Henna imports have been allowed into the country, with the stipulation that they are only for use on hair. The FDA considers PPD, along with Silver Nitrate, Chromium or Pyrogallol “adulterants” and outlaws their use on skin for the enhancement of Henna^[15]. However, despite these laws, prosecution for the sales of PPD enhanced henna seem unlikely in the USA, since it is not federally regulated. Furthermore, many henna vendors operate short term, with the rapid turnover in part related to their causing sensitization and intolerance and developing a bad reputation in the wake of their sales. These short-term vending arrangements further frustrate any ability to regulate the activity.

Increased awareness and regulation of the use of henna tattoos adulterated with PPD are of importance on a global scale and should become a priority for medical and dermatologic organizations worldwide.



Figure 1 This example is of a fresh black henna temporary tattoo, well tolerated by its bearer.

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