

Addressing diagnostic challenges in suspected contact dermatitis to cosmetics: Can standard series and patient material suffice for patch test?

Dear Editor,

Contact dermatitis to cosmetics has shown a variable prevalence ranging from 9.8 to 16.5%, among all suspected cases of contact dermatitis.^{1,2} The commonly implicated allergens in patients with cosmetic contact dermatitis include cetrimonium bromide (CTAB), p-phenylenediamine (PPD) and fragrance mix.³ There are several allergens like p-phenylenediamine, fragrance mix, colophony, etc., in the cosmetic series which are also a part of the Indian Standard Series (ISS).

In this study, we evaluated the patch test positivity to allergens in the cosmetic series in patients with suspected allergic contact dermatitis to cosmetics and determined the common allergens which were a part of ISS. The patch test records of adult patients (≥ 18 years) with suspected contact dermatitis to cosmetics attending our department between January and December 2022 were analysed. All patients were patch tested with the Indian cosmetic series and relevant patient material.

Of the 60 eligible patients, 24 (40%) were males and 36 (60%) females between 18 and 75 years (mean age 40.4 ± 12.4 years) of age. Thirty seven patients (61.7%) had diffuse hyperpigmentation, i.e., non-eczematous pigmented contact dermatitis (PCD), while the remaining 23 (38.3%) had acute to subacute dermatitis. All patients had a history of cosmetic use including hair dye ($n = 49$), hair oils ($n = 42$), shampoos and cleansers ($n = 38$), skin-lightening creams ($n = 35$), perfumes/deodorants ($n = 32$), moisturising creams ($n = 32$), bindi/sindoor ($n = 14$), shaving creams ($n = 12$), lipsticks ($n = 8$) and sunscreens ($n = 6$).

Patch test reading was taken at 48 (day 2) and 96 h (day 4) after patch test application. The day 4 reading was regarded as confirmatory. Twenty one patients (35%) demonstrated a positive patch test reaction to allergens of the cosmetic series and/or patient material. Interestingly, a higher percentage of patients with acute to subacute allergic cosmetic dermatitis (12/23; 52.2%) had positive patch test reactions compared

to those with PCD (9/37; 24.3%) ($p = 0.02$). The primary allergens identified in the cosmetic series were PPD, colophony and thiomersal. Moreover, there was a significant overlap between allergens commonly found in the ISS and cosmetic series, including PPD ($n = 9$), colophony ($n = 3$), fragrance mix ($n = 2$) and paraben ($n = 2$). Among the 16 patients who reacted positively to the cosmetic series, in 13 patients, the allergens were also a part of the ISS, yielding a statistically insignificant difference in positivity rates ($p = 0.52$) [Table 1].

In our study, out of 60 suspected cases of contact dermatitis, 21 (35%) patients had a positive patch test to allergens of the cosmetic series and/or patient material. In some previous studies from India, the positivity with the cosmetic series has varied from 59.2 to 72.6%.^{3,4} This low positivity rate in our study is possible because of the large number of patients with PCD, where the patch test positivity is low. Ghuse *et al.* reported 30% (15/50 patients) patch test positivity in patients of facial melanosis suspected to be caused by contact allergens. An additional five (10%) patients were photopatch test positive.⁵ Similarly, Hassan *et al.* showed that among eight patients of Riehl's melanosis, only two (25%) had a positive patch test for allergens of the cosmetic series.⁶ The most common allergen detected by Sharma *et al.* on positive patch testing, in 72.8% (52/74) patients with PCD were cetrimonium bromide (CTAB) and gallate mix.³ However, gallate mix has been removed from the current cosmetic series and this may be contributing to the low yield of positive results, especially in patients with PCD.

Rastogi *et al.* evaluated 50 patients of suspected cosmetics-induced facial dermatoses and reported that positive reactions occurred significantly more commonly with ISS than with allergens of the cosmetic series ($p = 0.053$). In their study, PPD was the most common allergen seen in nine (18%) patients which are there in both ISS and the cosmetic series. NiSO_4 was positive in eight patients (16%); which is not a part of the cosmetic series.⁷ Many allergens in the cosmetic

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Table 1: Patients with positive patch test reaction to allergens of cosmetic series and/or patient material, and their relevance

S. No.	Clinical diagnosis	Cosmetic series	Patient material	Relevance
1.	Pigmented contact dermatitis to hair dye	PPD	Hair dye cream and developer	Current
2.	Contact dermatitis to facial cosmetics	-	Face cream	Current
3.	Pigmented contact dermatitis to facial cosmetics	Hexamine	-	Doubtful
4.	Contact dermatitis to hair dye	PPD Lavender absolute	Hair dye cream and developer	Current
5.	Contact dermatitis to hair dye	PPD*	Hair dye cream	Current
6.	Contact dermatitis to sindoor	Thiomersal	Sindoor	Current
7.	Pigmented contact dermatitis to cosmetics	-	Hair dye cream	Past
8.	Contact dermatitis to lip cosmetics	-	Lipstick	Current
9.	Pigmented contact dermatitis to cosmetics	PPD* Benzyl salicylate Fragrance mix*	Hair dye cream and developer Sundscreen	Current
10.	Contact dermatitis to bindi/sindoor	Colophony*	Liquid sindoor	Current
11.	Pigmented contact dermatitis to cosmetics	-	Skin serum, face pack	Past
12.	Contact dermatitis to hair dye	PPD*	Hair dye cream	Current
13.	Pigmented contact dermatitis to cosmetics	Thiomersal	Negative	Doubtful
14.	Contact dermatitis to hair dye	PPD*	Loreal hair dye	Current
15.	Pigmented contact dermatitis to cosmetics	Paraben	-	Current
16.	Contact dermatitis to lip cosmetics	-	Lip balm	Current
17.	Contact dermatitis to henna	Colophony*	Mehendi	Doubtful
18.	Contact dermatitis to bindi	Colophony*	-	Current
19.	Pigmented contact dermatitis to hair dye	PPD*	Hair dye cream and developer	Current
20.	Contact dermatitis to hair dye	PPD*	-	Current
21.	Pigmented contact dermatitis to cosmetics	PPD*, Fragrance mix*	Hair dye cream and developer	Current

*Allergens common to cosmetic series and ISS: Indian Standard Series; PPD: p-phenylenediamine

series that are commonly implicated as the cause of cosmetic dermatitis are present in ISS too.

Patch testing with the standard series may miss some possible allergens and it would be prudent to patch test with the cosmetic series in all patients suspected to have cosmetic dermatitis. However, the standard series and the patient's

own material may be patch-tested to detect the causative allergens in resource-limited settings. Moreover, there is a considerable difference in the cost of ISS (costs approx. 100 INR) and the cosmetic series (costs approx. 200 INR) (Systopic Laboratories, New Delhi).

Hence, patch testing with ISS and patient material appears to be a reasonable and cost-effective alternative in patients with suspected contact dermatitis to cosmetics, in case of non-availability of cosmetic series and cost constraints.

Ethical approval

The Institutional Review Board approval is not required as this was a retrospective analysis of patient data records.

Declaration of patient consent

This was a retrospective analysis of patient data records.

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Conflicts of interest

There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation

The authors confirm that there was no use of artificial intelligence (AI)-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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