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Patch Testing as a Corroborative and Diagnostic Tool in Patients Suspected of Contact Allergen Induced Facial Melanosis

[Vedant M. Ghuse](#) and [Shylaja Someshwar](#)

From the Department of Dermatology, MGM Institute of Health Sciences and Medical College, Kamothe, Navi Mumbai, Maharashtra, India

Address for correspondence: Dr. Shylaja Someshwar, 201, Pramukh CHS, Plot No-64B, SECTOR 21 Kharghar, Navi Mumbai - 410 210, Maharashtra, India. E-mail: shaila38@yahoo.co.in

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Abstract

Background:

Hypermelanosis involving predominantly the face and neck is relatively common and often presents a complex diagnostic problem.

Objective:

To study the patterns of facial melanosis in Indian skin and assess the importance of patch testing as a corroborative tool in the diagnosis of facial melanosis.

Subjects and Methods:

A total of 50 patients who consented to the study and satisfied the inclusion and exclusion criteria were incorporated in the study. These patients were subjected to a detailed history, clinical, dermoscopic, and histopathological evaluation. Patch testing using the universal series, cosmetic series, and photopatch was done on those who satisfied the inclusion criteria. Suspected allergen "as is" patch testing was done in selected cases.

Results:

Facial melanosis as a result of contact dermatitis is a common entity and was seen in the age group of 18–70 years in both the sexes with male to female ratio of 6.5:2.5 indicating a male preponderance. The most common dermoscopic finding was the presence of reticular pigment network seen in 33 (66%) cases. Histopathology showed increased basal melanin in 56% and pigment incontinence in 26% of the cases. The commonest allergen in men was found to be potassium dichromate (15%), while in females it was nickel (20%). Photopatch test was done for all the patients and was positive in five cases (10%). Suspected allergen "as is" patch testing was negative in all the cases.

Conclusions:

Facial melanosis as a result of contact dermatitis can be confused with other acquired dermatological conditions causing hyperpigmentation. Therefore, a detailed history of contact with allergens has to be elicited, and if found relevant, has to be confirmed by patch testing.

Key Words: *Dermoscopy, facial melanosis, patch test*

Introduction

A complex diagnostic dilemma arises when dealing with hypermelanosis involving predominantly the face. The causes of the pigmentation are often obscure and many transitional forms defy classification into a specific well-defined disorder. External agents (light and photodynamic chemicals) which are essential factors in the occupational melanoses are also implicated in photocontact dermatitis (Riehl melanosis), erythromelanosis, and poikiloderma of Civatte.[1] Cosmetics may occasionally cause facial melanosis.[1] Patch testing relies on the observation that primed antigen-specific T lymphocytes will be present throughout the body, and hence, the allergen in the patch test can be applied to normal skin, usually on the upper back where the tests are least likely to be disturbed.[2] The clinicopathological features of various disorders causing facial melanosis are well-described. However, not much information is currently available regarding their dermoscopic and patch-test findings. We undertook this study to describe the dermoscopic features in facial melanosis and to explore the role of patch testing in these patients.

Subjects and Methods

The present study was undertaken in the Department of Dermatology at MGM Medical College and Hospital, Kamothe, Navi Mumbai, Maharashtra. A total of 50 patients who consented to the study and satisfied the inclusion and exclusion criteria were incorporated in the study. Patients presenting for the first time and not on any active treatment for the given cause were included in the study. Patients diagnosed as melasma, congenital facial melanosis, and acute eczema were excluded from the study. Patients on oral corticosteroids or immunosuppressants, pregnant/lactating patients, and patients having other systemic diseases were also excluded. These patients were subjected to a detailed history, clinical, dermoscopic, and histopathological evaluation. Patch testing using the universal series, cosmetic series, and photopatch was done on those who satisfied the inclusion criteria. Suspected allergen "as is" patch testing was done in selected cases.

Results

Fifty patients were enrolled in our study. The mean age was 38 (range: 18–70) years, with a male to female ratio of 6.5:2.5 indicating a male preponderance. The chronic nature of the disease is implicated by the fact that 46% of the cases had more than 6 months of disease. About 58% of the patients gave a history of sun exposure daily for a variable time of less than an hour. About 25% of the patients with photodermatoses gave a history of sun exposure. Seasonal variation in the complaints was noted, out of which 26% of the patients reported summer exacerbation and 6% reported winter exacerbation. History of atopy was present in 22% of the cases. The maximum cases in the study group had bilateral facial involvement (70%). Nickel (20%) emerged as the most common allergen [Figure 1] followed by potassium dichromate (15%) [Graph 1]. Suspected allergen "as is" patch test was done for incriminated suspected allergens and was negative in all cases. The commonest allergen in men was found to be potassium dichromate (15%) followed by thiomersal (10%), correlating with their outdoor activities, while in females, the commonest allergen was nickel (20%) followed by fragrance mix (15%) suggesting the role of cosmetic use and artificial jewelry. Hyperpigmentation (98%) and pruritus (24%) were the most common complaints [Graph 2]. The major sites of involvement were the face (70%), forehead (30%), neck (28%), axilla (16%), inner thighs (14%), and upper extremity (10%).

Dermoscopic features

The most common dermoscopic finding was the presence of a reticular pigment network [Figure 2], seen in 33 (66%) cases. The next common dermoscopic finding was dots and globules seen in 21 (42%) cases. Dots and globules were accompanied by an exaggerated pseudoreticular pigmentary network in 17 cases.

Accentuation of pigmentation around hair follicle openings was seen in 9 (18%) cases.

Histopathological features

Melanophages in the upper dermis were observed in all the biopsy specimens. An increase in basal layer melanization [Figures 3 and 4] ($n = 28$, 56%), pigment incontinence ($n = 13$, 26%), superficial perivascular lymphocytic infiltrate ($n = 10$, 20%), basal cell vacuolization (epidermal $n = 10$, 20%; follicular in 4, 8%), and necrotic keratinocytes ($n = 4$, 8%) were the other histological findings.

Patch and photopatch test results

Patch test results were recorded on days 2, 4, and 7. All readings with an International Contact Dermatitis Research Group (ICDRG) grading 1+ or above were considered positive for the allergens. It was observed that 15 (30%) patients had positive patch test results. Photopatch test was done for all patients and was positive in five cases (10%). The most common age group for patch test positivity was 20–30 years (50%). The males were predominant (75%) among the positive patch test results.

Discussion

Although a review of literature gives enough idea about contact dermatitis as a cause of facial melanosis there only a few studies reported so far. Our study undertook 50 patients with facial melanosis and correlated the cause with superimposed contact dermatitis.

Facial melanosis is a common complaint in day-to-day dermatological practice, and requires careful evaluation since it produces significant psychological, social, and personality concerns. Drastic measures are taken by the patient in an attempt to treat the same usually may have a deleterious effect on the patient. In such circumstances, the management includes a detailed history, clinical examination, and appropriate investigations to find the causes of such melanosis. Patch testing or epicutaneous testing is a simple, scientific, and only means of unmasking the cause and nature of allergens in patients of pigmented contact dermatitis of the face. Patch testing relies on the observation that primed antigen-specific T lymphocytes will be present throughout the body, and hence, allergens in the patch test can be applied to the normal skin.[3]

Age plays a minor role in sensitization elicitation but represents an important factor in patch testing. In our study, a high proportion of patients (34%) were in the 20–30 years age group followed by the 40–50 years age group constituting about 26% of the total cases. A similar study conducted by Pramod Kumar which enrolled 50 patients showed 20–40 years as the most common age group affected.[4] The number of positive patch test reactions tends to increase with age as found in the other studies[5,6] due to the accumulation of allergies acquired over a lifetime, and occupational sensitization may occur only after decades of contact with the sensitizer.[7] Sensitivities may also fade with time,[8] but this is probably due to the lack of exposure rather than age *per se*. However, the inflammatory response is diminished in elderly patients.[9] Young adults are more likely to have occupational or cosmetic allergies; elderly people are more liable to medicament and 'historic' sensitivities.

In our study, we found that facial pigmentation was more common in males (66%) as compared to females (34%), showing male preponderance probably due to excessive sunlight exposure and occupational exposure to allergens. In a study conducted by Singh and Reddy, facial pigmentation was more common in females due to Allergic contact dermatitis (ACD).[10] The reason for female predominance in clinical patch studies is explained by a large number of metal-sensitive females, which is largely the result of ear piercing and greater exposure to fragrances, cosmetics, and hair dye. It is of interest that nickel sensitivity seems to be less common in men even if they wear earrings.

Seasonal variations as a complaint were noted in 32% of the patients. Increased sweating due to leaching of the allergen may be the possible cause for exacerbation in summer. In our study, seasonal variation was present in the form of summer exacerbation in 26% of the patients and winter exacerbation in 6% of the

patients which can be indicative of photoallergy or phytophotoallergy. Uter *et al.*[11] conducted a study which gave conflicting evidence concerning the influence of season on weak positive, possibly false positive, irritant reactions.

The face was the most common site of involvement (70%) in the present study, followed by forehead (30%), neck (28%), and upper extremities (10%) as these are most heavily exposed to the sun and are the prime targets of photocontact dermatitis. A similar study by Pramod Kumar showed the face as the most common site (47.37%), then neck (21.05%), and finally, scalp (10.53%). The sites for hair dye allergy (face and neck were commonly involved in males) whereas hands (9.68%) were exclusively involved in females.[4] In a study by Jacobs *et al.*[12] for positive patch test for preservatives found face as the most common site of affection (56%).

The most common complaint was itching (24%) followed by scaling (20%), burning (14%), and pain (4%). All patients complained of varying amounts of hyperpigmentation (98%). A study conducted by Ancona-Alayón on occupational contact dermatitis from Naphthol AS in which out of 53 patients, 12 patients presented with hyperpigmentation on exposed areas without pruritus.[13]

In our study, the total duration of facial hyperpigmentation in a majority of patients (46%) was between 6 months and 1 year implicating the chronic nature of certain eczemas. Adam and Maibach conducted a study which reported that the duration of dermatitis prior to the consultation was 8 days or longer in nearly all the cases.[14]

Exposure to sunlight (48%) and sweating (6%) were the most common aggravating factors. Relieving factors included over-the-counter topical medication (12%) and avoidance of sun exposure (4%). History of atopy was present in 22% of the patients; more in males compared to females. The most common manifestation was allergic rhinitis. Most studies also report a similar frequency of dermatitis in patients with a personal and family history of atopy, except Stingeni *et al.*[15,16] and Lammintausta K *et al.*[17] Some studies show a prevalence of contact dermatitis in atopic patients, especially to medicinal drugs, while others disagree.[17]

The most common cleansing agent in our study was soaps and detergents (44%). A similar study conducted by YC Minocha showed similar results in which out of 200 patients suffering from ACD to soaps showed patch test positive in 79%.[18] The contact sensitivity was more frequently seen with perfumed soaps (48%), glycerin soaps (32%), and antiseptic soaps (4.4%) predominantly in females.[18]

History of sun exposure of more than 1 hour was present in 58% of the patients. A similar study conducted by Nidhi Jindal reported summer exacerbation in 50% of the patients and a history of exacerbation of dermatitis within a few minutes to 4 hours of sun exposure.[19]

The presence of melanophages in the upper dermis was observed in all the biopsy specimens. Increase in basal layer melanization ($n = 28$, 56%), pigment incontinence ($n = 13$, 26%), superficial perivascular lymphocytic infiltrate ($n = 10$, 20%), basal cell vacuolization (epidermal $n = 10$, 20%), follicular in 4, 8%), and necrotic keratinocytes ($n = 4$, 8%) were the other histological findings. Two patients showed nonspecific dermal melanosis. In similar studies conducted by Rorsman and Nakayama, dense inflammatory infiltrate in the superficial dermis admixed with melanophages were prominent histopathological findings in a majority of pigmented contact dermatitis patients.[20,21]

Patch Testing

Patch test plays an important role in finding out the causative allergens in suspected cases of contact dermatitis in patients with facial melanosis. In this study, it was observed that 40% of the patients had positive patch test results. Out of 50 patients subjected to patch test, 15 patients had positive patch test (30%) and 5 patients had additional photopatch test positivity (10%).

Among the 20 cases which had positive patch results, 50% of the cases were from the age group 20–30 years. The next frequent groups were 30–40 years (25%), 40–50 years (10%), and 50–60 years (10%). It is in accordance with the study conducted by Pramod which showed maximum patch test positive patient

(58%) in the age group of 21–40 years.[4]

Negative results were seen in 30 cases (60%).

Suspected allergen "as is" patch test was done in 19 patients (38%) and was found to be negative. The most common household allergen used were, *Kumkum*, (16%) turmeric, (11%), *besan* paste (11%), Fuller's earth (6%), almond oil, (5%), and *neem* paste (5%). A study conducted by Nath and Thappa tested 46 patients with pigmented contact dermatitis and tested 13 patients with *Kumkum* out of which 7 patients (15%) were positive.[22]

The most common contact allergens in our study were cosmetics (24%) and household allergens (24%).

Nickel (20%) emerged as the most common allergen causing facial melanosis, followed by potassium dichromate (15%), thiomersal (10%), and fragrance allergen (10%). Our study was in accordance with AK Bajaj which also reported nickel as the most common allergen (12.9%), followed by potassium dichromate (11.1%), neomycin (7%), mercaptobenzthiazole (6.6%), and fragrance mix (5.5%).[23]

The most common cosmetic allergens were fragrance mix (10%), thiomersal (10%), rose oil (5%), and sorbitan sesquioleate (5%). In a study conducted by Pramod, gallate mix (40%) was reported as the most common cosmetic allergen.[4] Dogra *et al.*[24] tested 200 females and found paraphenylenediamine as the commonest allergen (35%). A similar study by A. Nath reported thiomersal as the most common preservative allergen (54%).[22]

Photopatch test was done in all the patients and was found to be positive in 10% of the patients. A similar study was conducted by Pramila A Kanchan in which 50 patients were subjected to photopatch test out of which 10 patients were positive (20%).[25]

In our study, the males had high-patch and photopatch-positive (75%) results than females (25%).

As per our observations, the commonest allergen in males was found to be potassium dichromate (15%), whereas nickel (20%) and fragrance mix (10%) were the commonest allergens in females suggesting a role of cosmetic use and artificial jewelry. This is in accordance with the other studies which showed nickel, thiomersal, perfumes, and neomycin as the commonest allergens.[23] The study reported by A K Bajaj showed similar results in which potassium dichromate in males (30%) and nickel (43%) in females was the commonest contact sensitizer.[23]

The final diagnosis based on history, symptoms, clinical features, histopathology, and patch tests were photomelanosis (30%) cases, acanthosis nigricans (20%), photodermatitis (16%), frictional melanosis (16%), lichen planus pigmentosus (8%), pigmented contact dermatitis (4%), phytophotodermatitis (2%), and exogenous ochronosis (4%). A study by Iffat Hassan in 2015 on facial melanosis reported that out of 208 patients of facial melanosis, the most common cause was melasma (35.09%), post-inflammatory hyperpigmentation (16.34%), periorbital hyperpigmentation (6.7%), lichen planus pigmentosus (4.8%), Riehl's melanosis (5.7%), and drug-induced pigmentation (2.88%).[26]

Conclusions

We have described the spectrum of clinical, histological, and dermoscopic features of facial melanosis and correlated them with patch testing in order to obtain a probable cause. Most facial melanosis as a result of contact dermatitis can be confused with other acquired dermatological conditions causing hyperpigmentation. Therefore, a detailed history of contact with allergens has to be elicited, and if found relevant, has to be confirmed by doing a patch test.

The main purpose of this study was to assess the importance of patch testing as an important diagnostic and corroborative tool in facial melanosis in the Indian population.

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Conflicts of interest

There are no conflicts of interest.

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References

1. Griffiths C, Barker J, Bleiker T, Chalmers R, Creamer D. *Rook's Textbook of Dermatology*. 9th ed. Wiley Blackwell: John Wiley and Sons; 2016. p. 88.09.
2. Griffiths C, Barker J, Bleiker T, Chalmers R, Creamer D. *Rook's Textbook of Dermatology*. 9th ed. Wiley Blackwell: John Wiley and Sons; 2016. pp. 128–64.
3. Burns T, Breathnach S, Cox N, Griffiths C. *Patch testing*. Rooks, Wiley Blackwell: Textbook of Dermatology; 2010. p. 26.84.
4. Kumar P, Paulose R. Patch testing in suspected allergic contact dermatitis to cosmetics. *Dermatol Res Pract*. 2014;2014:695387. [PMCID: PMC4175377] [PubMed: 25295057]
5. Coenraads PJ, Nater JP, Van der Lende R. Prevalence of eczema and other dermatoses of the hands and arms in Netherlands. Association with age and occupation. *Clin Exp Dermatol*. 1983;8:495–503. [PubMed: 6227435]
6. Mangelsdorf HC, Fleischer AB, Sherertz EF. *Patch testing in aged population without dermatitis: High prevalence of patch test positivity Am J Contact Dermatitis*. 1996;7:155–7. [PubMed: 8957330]
7. Hovding G. *Cement Eczema and Chromium Allergy. An Epidemiological Investigation*. Norway: University of Bergen; 1970.
8. Agrup G. Hand eczema and other hand dermatoses in South Sweden. *Acta Derm Venereol Suppl (Stockh)* 1969;49:5–91.
9. Lejman E, Stoudemayer T, Grove G, Kligman AM. Age differences in poison ivy dermatitis. *Contact Dermatitis*. 1984;11:163–7. [PubMed: 6238788]
10. Singh S, Reddy BS. Cosmetic dermatitis—current perspectives. *Int J Dermatol*. 2003;42:533–42. [PubMed: 12839603]
11. Uter W, Geier J, Land M, Pfahlberg A, Gefeller O, Schnuch A. Another look at seasonal variation in patch test results. A multifactorial analysis of surveillance data of the IVDK. Information network of departments of dermatology. *Contact Dermatitis*. 2001;44:146–52. [PubMed: 11217986]
12. Jacobs MC, White IR, Rycroft RJ, Taub N. Patch testing with preservatives at St John's from 1982 to 1993. *Contact Dermatitis*. 1995;33:247–54. [PubMed: 8654076]
13. Ancona-Alayón A, Escobar-Márques R, González-Mendoza A, Bernal-Tapia JA, Macotela-Ruíz E, Jurado-Mendoza J. Occupational pigmented contact dermatitis from Naphthol AS. *Contact Dermatitis*. 1976;2:129–34. [PubMed: 139268]
14. Adams RM, Maibach HI. A five-year study of cosmetic reactions. *J Am Acad Dermatol*. 1985;13:1062–9. [PubMed: 4078100]
15. Weisshaar E, Radulescu M, Soder S, Apfelbacher CJ, Bock M, Grundmann JU, et al. Secondary individual prevention of occupational skin diseases in health care workers, cleaners and kitchen employees: Aims, experiences and descriptive results. *Int Arch Occup Environ Health*. 2007;80:477–84. [PubMed: 17091305]

16. Stingeni L, Lapomarda V, Lisi P. Occupational hand dermatitis in hospital environments. *Contact Dermatitis*. 1995;33:172–6. [PubMed: 8565458]
17. Lammintausta K, Kalimo K, Havu VK. Occurrence of contact allergy and hand eczemas in hospital wet work. *Contact Dermatitis*. 1982;8:84–90. [PubMed: 6461509]
18. Minocha YC, Sood VK, Dogra A. Contact sensitivity to toilet soaps. *Indian J Dermatol Venereol Leprol*. 1994;60:144–5.
19. Jindal N, Sharma NL, Mahajan VK, Shanker V, Tegta GR, Verma GK. Evaluation of photopatch test allergens for Indian patients of photodermatitis: Preliminary results. *Indian J Dermatol Venereol Leprol*. 2011;77:148–55. [PubMed: 21393943]
20. Rosarman H. Riehl's melanosis. *Int J Dermatol*. 1982;21:75–8. [PubMed: 7068304]
21. Nakayama H. Pigmented contact dermatitis and chemical depigmentation. In: Rycroft R, Menne T, Frosch P, Iepoittevin J, editors. *Textbook of Contact Dermatitis*. 3rd ed. New York, NY: Springer; 2001. pp. 319–33.
22. Nath AK, Thappa DM. Patch testing in cosmetic dermatoses: A report from South India. *Int J Dermatol*. 2007;5:1.
23. Bajaj AK, Saraswat A, Mukhija G. *Patch testing experience with 1000 patients Indian J Dermatol Venerol*. 2007;2007:313–8. [PubMed: 17921610]
24. Dogra A, Minocha Y, Kaur S. Adverse reactions to cosmetics. *Indian J Dermatol Venereol Leprol*. 2003;69:165–7. [PubMed: 17642868]
25. Kanchan PA, Sheno SD, Baakchandran C. Five years experience of photopatch testing in 50 patients. *Indian J Dermatol Venereol Leprol*. 2002;68:86–7. [PubMed: 17656886]
26. Hassan I, Aleem S, Bhat YJ, Anwar P. A clinico-epidemiological study of facial melanosis. *Pigment Int*. 2015;2:34–40.

Figures and Tables

Figure 1

Showing a patient of exogenous ochronosis with +1 patch and +2 photopatch positivity to nickel sulphate. Biopsy (H and E stain, 10X) showed dermal melanosis with superficial perivascular infiltrate. Dermoscopy showed hyperchromic blue-brown granules with surrounding globules and scaling

Graph 1

Allergens positive in patch testing

Graph 2

Chief complaints of the patients

Figure 2

Showing a patient of frictional melanosis with +2 patch and +2 photopatch positivity to thiomersal. Biopsy (H and E stain, 10X) showed pigment incontinence and solar elastosis. Dermoscopy showed an accentuated reticular pigmented network with hyperpigmented globules

Figure 3

Showing a patient of photomelanosis with +2 patch and +1 photopatch positivity to fragrance mix. Biopsy (H and E stain, 10X) showed increased basal melanin, irregular rete ridges, and pigment incontinence. Dermoscopy showed accentuated reticular-pigmented network with hyperpigmented dots and globules

Figure 4

Showing a patient of acanthosis nigricans with +2 patch and +1 photopatch positivity to 4-phenylenediamine base. Biopsy (H and E stain, 10X) showed acanthosis, mild papillomatosis, and increased basal melanin. Dermoscopy—accentuated normal pseudoreticular pattern with irregular blotches, scaling

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