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## **Contact sensitivity to textile dyes in patients with pigmented purpuric dermatosis**

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**Running head:** Pigmented purpuric dermatoses & textile dyes

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**Purpose:** The etiology of pigmented purpuric dermatoses is unclear. Recent studies speculate about contact sensitivity to play a role in the etiology of the disease. In most patients, the lesions begin and stay limited on the lower extremities as textile products are in tight contact with the skin. Also, textile dyes can cause contact dermatitis of purpuric type. This study was conducted in order to understand whether the contact sensitivity plays a critical role in the etiology of pigmented purpuric dermatoses.

**Materials and Methods:** Patients with diagnosis of pigmented purpuric dermatoses were included in the study. Patch tests were applied at the back of all patients with textile series (Chemotechnique Diagnostics TF-1000) which have 33 allergens containing textile dyes, material and protectors by IQ Ultra Chamber. Test sites were evaluated at 48, 72, 96. hours and on the 7th day according to the criteria of the International Contact Dermatitis Research Group. The evaluation results were recorded in patient files and the results were statistically compared.

**Results:** Eighteen males (60%) and 12 females (40%), a total of 30 patients were included in the study. Schamberg disease in 23 patients (76.7%), lichen aureus in 5 patients (16.7%) and Majocchi disease in 2 patients (6.7%) were described out of total 30 patients. No contact sensitivity was detected in any of the patients.

**Conclusion:** Contact sensitivity to textile dyes was not found as an etiologic factor in our study group.

Key words: Contact sensitivity, patch test, pigmented purpuric dermatosis, Schamberg disease, textile dyes

## Introduction

Pigmented purpuric dermatoses are a group of diseases characterized by brown or yellow petechia, purpura and sometimes telangiectasia. Although the etiology is not completely known, vascular damage due to type IV immunological mechanism and extravasation of erythrocytes are held responsible. There are several different types of pigmented purpuric dermatoses with discrete clinical but common histopathological features. All types tend to settle particularly on the lower extremities.<sup>1,2</sup>

Allergic contact dermatitis (ACD) is a delayed cellular hypersensitivity reaction to the contact allergen. In recent years, it has been seen that ACD can exhibit with different non-eczematous clinical variants besides the classical eczematous forms, and these types are classified as non-eczematous ACD. Various clinical patterns of non-eczematous ACD have been described; erythema multiforme-like, purpuric, lichenoid, lymphomatoid, pigmented, pustular and dyshidrosiform contact dermatitis. Among these types, allergic purpuric dermatitis presents with purpura instead of eczematization.<sup>3</sup> It was found that azo dyes and textile resins are the most frequent factors to cause purpuric contact dermatitis.<sup>4,5,6,7</sup> Positive patch test is the gold standard for diagnosis of allergic purpuric dermatitis.<sup>4,5</sup> This type of ACD with purpuric lesions suggests that contact sensitivity may play as an aetiological factor for pigmented purpuric dermatoses wherein purpura is also the main elementary lesion. Most pigmented purpuric dermatoses lesions start on lower extremities and usually stay limited to this region. Textile products are often in close contact with this anatomical area. In the literature survey, it was observed in studies that contact sensitivity in pigmented purpuric dermatoses was only limited to the European standard series<sup>8,9</sup>, and the sensitivity to textile products was not investigated. Due to clinical similarity of pigmented purpuric dermatoses with purpuric contact dermatitis, we aimed to investigate contact sensitivity to textile products which frequently contact with the predilection site of pigmented purpuric dermatoses.

## **Materials and Methods**

This descriptive cross-sectional study was carried out in the Dermatology Department of Kocaeli University School of Medicine between April 2016 and August 2017 after approval by the ethics committee (GOKAEK 2016/92). Patients, who were diagnosed with pigmented purpuric dermatoses in our out-patient clinic within the study period were included in the study. Diagnosis of pigmented purpuric dermatoses was based on clinical findings; histopathological confirmation was performed if there was any clinical suspicion. Written informed consent was provided by all participants.

Patients younger than 18 years, pregnant or breastfeeding woman, patients who received antihistamine or pentoxifylline within the last week and patients who received systemic steroid or immunosuppressive treatment within the last 3 weeks were not included in the study.

Textile series (Chemotechnique Diagnostics TF-1000) with 33 allergens were used for this study. The test materials were applied to the patient's upper back with IQ Ultra Chamber (Chemotechnique Diagnostics). After 48 hours, test materials were removed. If the dye remained on the patient's back, it was cleaned with water and gauze. The first assessment was made half an hour after removal (D2). Subsequent evaluations were done at 72nd (D3) and 96th hours (D4), and 7 days later (D7). The evaluations were based on the scheme proposed by the International Contact Dermatitis Research Group. We planned to reperform the patch test with the positive allergen on the lesion site in case of any positive reaction was observed.

## **Results**

A total of 30 patients were included in the study, 18 men (60%) and 12 women (40%) with pigmented purpuric dermatoses. The median age of the study group was 57 (18-84) years. Lesions were found on the lower extremities in 22 patients (73.3%), on the lower extremities

and the abdomen in five patients (16.7%) and on the lower and upper extremities in three patients (10%) (Table 1). The lesions were predominantly present on the lower extremities without any statistical significant difference between the men and women when the location of the lesions were considered ( $p = 0.603$ ).

Schamberg disease was found in 23 (76.7%), lichen aureus in five (16.7%) and Majocchi disease in two patients (6.7%). The median duration of lesions was 24 (1-360) months.

Seven of the 30 pigmented purpuric dermatoses patients (23.3%) were found to have at least one allergen-associated erythema at D2 in a total of 13 test sites. Erythema disappeared completely at D3. Thus, this erythema observed in these areas was considered as an irritant reaction. Mentioned irritant reactions were seen as in the following: one patient with disperse red-1, three patients with disperse red-17, one patient with dimethylol dihydroxyethylurea, one patient with disperse blue-85, one patient with disperse orange-1, two patients with disperse brown-1, two patients with basic red-46, one patient with reactive red-123, one patient with reactive red-238 and one patient with disperse blue mix-106/124. None of the remaining 23 patients had any reaction at any time of evaluation. The test was not repeated on any lesion area as none of the patients showed any positive reaction.

## Discussion

Possible role of contact sensitivity in the aetiology of pigmented purpuric dermatoses has been mentioned in the recent years.<sup>1,8</sup> Pigmented purpuric dermatoses lesions are mainly located on the lower extremities, and textile products are frequently in contact with this region. Purpuric contact dermatitis, which has a similar clinical presentation as pigmented purpuric dermatoses, is mostly associated with textile dyes.<sup>4,5,6,7</sup> Thus, we used textile series to investigate the role of contact sensitivity to textile materials in pigmented purpuric

dermatoses aetiology. This textile series have 33 allergens which contain textile dyes and protectors.

Our patients were evaluated at D2, D3, D4, D7. Seven of the patients showed erythema at D2. In all of these areas, the dye was evaluated as an irritant as the erythema disappeared at D3. There was no positivity in any of the test sites on evaluation at D3, D4, D7 in any patient. This result suggested that there is no significant relationship between pigmented purpuric dermatoses and contact sensitivity to textile materials.

According to our knowledge, there have been few studies investigating contact sensitivity in patients with pigmented purpuric dermatoses. Engin et al.<sup>8</sup> applied European standard series to 22 pigmented purpuric dermatoses patients and found 12 of 22 patients to have a positive result with at least one allergen. These allergens were nickel sulphate in seven patients, fragrance mix in six patients, disperse blue in four patients, formaldehyde resin in four patients, cobalt chloride in one patient and epoxy resin in one patient. Subsequently, four allergens (nickel sulphate, fragrance mix, disperse blue 106, formaldehyde resin) were applied to the lesion site of the patch test positive patients. Positive reaction was detected in the lesion area with nickel sulphate in two patients, fragrance mix in four patients, disperse blue 106 in two patients and formaldehyde resin in one patient. They noted that the lesions were cleared after the elimination of the allergen in four patients in whom the patch test was positive both at the usual site and at the lesion site. The clearance was complete in three patients and partial in one. Authors thought that patch testing at both sites—the usual site and the lesion site—may reflect a direct aetiological relationship between an allergen and pigmented purpuric dermatoses.<sup>8</sup> Two test allergens, disperse blue-106 and formaldehyde resins, which were used by Engin et al.<sup>8</sup> were also used in our study; however, no positive reaction was observed in any of our patients.

In a large study reported by Gönül et al.<sup>9</sup>, it was shown that there was no relation between pigmented purpuric dermatoses and contact sensitivity. In this study, patch test was performed with European standard series in 24 pigmented purpuric dermatoses patients; consequently, 20 patients had Schamberg disease, three had lichen aureus and one had Doucas and Kapetanakis' eczema-like purpura. Positive reaction was detected with nickel sulphate, potassium dichromate, cobalt chloride hexahydrate, fragrance mix-1 and -2, neomycin sulphate, sesquiterpene-lactone mix and tixocortol-21-pivalate in the pigmented purpuric dermatoses group. Positive patch test was also detected with at least one allergen in the control group, and statistically no significant difference was found between the two groups. The most frequent site of involvement was the lower extremities. European standard series was used in this study, and we can not make an inter-study comparison as these abovementioned items were not used in our study.

A case report has suggested that pigmented purpuric dermatoses may be related to contact sensitivity to textile dyes. In this report, a patient with lichenoid purpura of Gougerot–Blum was tested with textile series applied to the back region. An erythematous response was obtained with disperse blue 106 and 124 on the dorsal area, and these materials were then re-applied under the knee. It was seen that the reaction was positive under the knee in the form of erythema and petechiae. In addition, the lesions became widespread after the patient wore a new blue dress. The authors proved that pigmented purpuric dermatoses was actually purpuric contact dermatitis in this case.<sup>6</sup> We also used textile series in our study, but we did not detect positive reactions in any patient. This result may be due to the fact that none of our patients had lichenoid purpura of Gougerot–Blum. In this case report, the authors also emphasized the importance of testing the lesion site with the suspected allergen if the patch tests at routine site were negative.<sup>10</sup> As it was not possible for us to apply all the test substances to the lesion-free lower leg (due to limited test area), we planned to perform the patch test on disease

predilection site only with positive allergens which showed positive or suspicious reactions in the back region. However, we did not repeat the test on the lesion-free lower leg because we did not detect any positive reaction or suspicious erythema at D3, D4, and D7 in any patient. Consequently, our study results suggest that there is no contact sensitivity to textile dyes in the aetiology of pigmented purpuric dermatoses. Because pigmented purpuric dermatoses are not common, our study has a limited number of patients. Studies with large patient series are needed on this subject.

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## Tables

**Table 1:** Demographic data of the study group

|                         |                           | <b>Female</b> | <b>Male</b>   | <b>Total</b>  |
|-------------------------|---------------------------|---------------|---------------|---------------|
|                         |                           | <b>(n=12)</b> | <b>(n=18)</b> | <b>(n=30)</b> |
| <b>Age (years)</b>      |                           | 57 (18-69)    | 59 (26-84)    | 57 (18-84)    |
| <b>Duration</b>         |                           | 30 (4-48)     | 21 (1-360)    | 24 (1-360)    |
| <b>(months)</b>         |                           |               |               |               |
| <b>Localisation (n)</b> | Lower extremity           | 8 (66,7%)     | 14 (77,8%)    | 22 (73,3%)    |
|                         | Lower extremity+ trunk    | 3 (25%)       | 2 (11,1%)     | 5 (16,7%)     |
|                         | Lower and upper extremity | 1 (8,3%)      | 2 (11,1%)     | 3 (10%)       |
| <b>Type (n)</b>         | Schamberg                 | 7(58,3%)      | 16 (88,9%)    | 23 (76,7%)    |
|                         | Lichen aureus             | 3(25%)        | 2 (11%)       | 5 (16,7%)     |
|                         | Majocchi                  | 2(16,7%)      |               | 2 (6,7)       |