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The Role of Contact Allergens on Facial Seborrheic Dermatitis

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Abstract

BACKGROUND/AIMS: Seborrheic dermatitis (SD) is an inflammatory skin condition characterised by scaly erythematous patches. The causes of SD include inflammatory reaction to Malassezia species, genetic predisposition and hormonal factors; however, any association with contact allergens has not been established. The purpose of this study is to investigate the role of contact allergens on facial SD.

MATERIALS AND METHODS: Thirty patients with symptoms of, or a prediagnosis of, facial SD along with 30 healthy individuals as the control group were included in this study. Two different sets of patch tests (international standard series IS-1000 and cosmetic series C-1000) were used in this study. Allergens were placed in small chambers and applied to the patients' backs. They were then evaluated 48 hours, 72 hours, and 1 week after the patches were removed. The results were classified according to the International Contact Dermatitis Research Group.

RESULTS: Positive reactions to standard and cosmetic series patch test allergens in the patient and control groups were not statistically significant.

CONCLUSION: It is not possible to establish an association between contact allergens and facial SD.

Keywords: Contact allergens, patch test, seborrheic dermatitis

INTRODUCTION

Seborrheic dermatitis (SD) is a persistant and recurring inflammatory skin condition characterised by erythematous patches with varying degrees of scales. This condition usually affects seborrheic areas like the scalp, face, chest, back, axilla and inguinal region.[1] Facial SD occurs in areas of face rich in sebaceous glands, including nasolabial folds, preauricular/postauricular regions, eyebrows and eyelids. Males are more commonly affected than females, with a peak incidence in the third and fourth decades of life.[2]

SD usually arises as an inflammatory reaction to Malassezia species, although a causal relationship has not been established. In addition, intrinsic host factors such as genetic predisposition, defective epidermal barrier, hormones, increase or change in sebaceous gland activity and host immune response, are important factors in SD pathogenesis.[2,3]

MATERIALS AND METHODS

Thirty patients who presented to the outpatient dermatology clinic, with symptoms or a prediagnosis of facial SD along with 30 healthy individuals as the control group, were included in this study. Two different sets of patch tests (international standard series IS-1000 and cosmetic series C-1000) were used in this study.

For SD patient group, data such as age, gender, occupation, education level, marital status, disease duration, treatments received, stress level, location of SD on the face and whether it showed seasonal variation, were recorded. Patients were subjected to international standard series

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containing 30 allergens and cosmetic series containing 63 allergens, as patch tests. Allergens were placed in small chambers and applied to the patients' back. They then were evaluated 48 hours, 72 hours and 1 week after the patches were removed. The results were classified according to the International Contact Dermatitis Research Group as follows: 0 (no reaction), +/- (erythema, suspicious result), + (erythema and infiltration), ++ (erythema, infiltration, papule, vesicle), +++ (erythema, infiltration, bulla). Pregnant women, those with active dermatitis, those who used medications such as antihistamines, leukotriene antagonists or topical steroids in the past week or systemic steroids in the last month, were excluded from the study. Ethical approval for this study was obtained from the University of Health Sciences Türkiye, Ankara Training and Research Hospital Non-Interventional Clinical Research Ethics Committee (approval number: 1312/2023, date: 06.09.2023).

Statistical Analysis

In descriptive statistics related to continuous data, mean, standard deviation, median, minimum and maximum values were provided. The Shapiro-Wilk test was used to examine the normal distribution fit of continuous data (such as age, duration of illness). Independent samples t-test was utilized for comparing the ages between patient and control groups. Nominal variables' group comparisons (in contingency tables) were conducted using chi-square and Fisher's exact tests. The diagnostic accuracy of the cosmetic series patch test was evaluated using sensitivity, specificity, positive predictive value, and negative predictive value. Statistical analyses were performed using IBM SPSS for Windows 20.0 (SPSS Inc., Chicago, IL), with a significance level set at $p<0.05$.

RESULTS

In the patient group, the median duration of illness was found to be 36 months. Treatment with topical corticosteroids was observed in 76.7% of patients, while shampoo was administered to 36.7% and immunomodulators to 10%. Among the patients, the usage rate of cosmetic moisturizers was 53.3%, cosmetic soaps stood at 50%, and other cosmetic products were used by 23.3%. Additionally, the rate of disease exacerbation due to stress was 60%, while seasonal changes contributed to an increase of 63.3%, with a rise of increases of 43.3% in winter and 16.7% in summer (Table 1).

In the patient group, the involvement rate in the eyebrow area was 60%, while it was 86.7% in the ala of the nose. The involvement rate in the auricular area was 30%; it was 16.7% in the chin area. Upon examination of the patients' involvement areas, it was noted that the highest involvement (86.7%) was observed in the ala of the nose. Additionally, it was found that 20% of patients had accompanying dermatological conditions including macular amyloidosis, acne, hirsutism, and pernio.

Table 1. Features of the patient group

	(n=30)
Disease duration (month); median (min.-max.)	36 (1-240)
Treatments	
Topical corticosteroid treatment, n (%)	23 (76.7)
Shampoo treatment, n (%)	11 (36.7)
Immunmodulator treatment, n (%)	3 (10.0)
Cosmetic moisturiser, n (%)	16 (53.3)
Cosmetic soap, n (%)	15 (50.0)
Other cosmetic products, n (%)	7 (23.3)
Seasonal variation	
Winter-related increase, n (%)	13 (43.3)
Summer-related increase, n (%)	5 (16.7)

min.: Minimum, max.: Maximum.

In 46.7% of the patient group, suspicious reaction was detected in the standard series patch test, while in the control group, suspicious reaction was observed in 13.3% of the participants. The difference in the rates of suspicious reactions in the standard series patch test results between the patient and control groups was statistically significant ($p<0.01$). In 76.7% of the patients, a suspicious reaction was observed in the cosmetic series patch test allergens, while no suspicious reaction was detected in the control group. There was a significant difference in the rates of suspicious reactions in the cosmetic series patch test results between the patient and control groups ($p<0.001$) (Table 2). The number of suspicious reactions to standard series patch test allergens in individuals using topical corticosteroids was found to be statistically significantly higher ($p<0.05$). Analysis of adverse reactions to standard series patch test allergens revealed no statistically significant differences between users of medical shampoos, immunomodulators, cosmetic moisturizers, soaps, other cosmetics, and non-users ($p>0.05$) (Table 3).

In 20% of the patient group, a positive reaction to standard series patch test allergens was detected, while 13% of the control group showed a positive reaction. The allergens that caused positive reactions in the patient group included textile dye mix, lanolin alcohol, colophonium, fragrance mix, mercapto benzothiazole, and cobalt chloride. The difference between the positive reactions to the standard series patch test in the patient and control groups was not statistically significant. In 13% of the patient group, a positive reaction to cosmetic series patch test allergens was detected, while none of the control group showed a positive reaction. The allergens that resulted in a positive reaction among the patient group included stearyl alcohol, hydroxyethyl alcohol, DMDM hydantoin, and octyl gallate. The difference between the positive reactions to the cosmetic series patch test in the patient and control groups was not statistically significant.

DISCUSSION

SD is a multifactorial inflammatory skin condition characterized by erythematous patches with scales, commonly affecting areas rich in sebaceous glands, especially the face, scalp, trunk, and body folds.[2] SD shows a bimodal age distribution: infantile and adult types. Infantile type, which manifests as scales on the scalp and erythematous plaques in the body folds, usually occurs within the first 3 months of life and resolves spontaneously within the first year. Adult type has a chronic course and affects patients' quality of life. While its etiology involves

Table 2. Comparison of standard and cosmetic series patch test results between the patient group and the control group

	Patient, (n=30)	Control, (n=30)	p
Standard allergen n (%)			
Suspicious reaction	14 (46.7)	4 (13.3)	0.005[b]
No reaction	16 (53.3)	26 (86.7)	
Cosmetic allergen n (%)			
Suspicious reaction	23 (76.7)	0	<0.001[b]
No reaction	7 (23.3)	30 (100)	

[b]Chi-square test.

Table 3. Comparison of standard series test results with given treatments in the patient group

Standard allergen	Suspicious reaction	No suspicious reaction	p
Topical steroid treatment n (%)			
Yes	8 (34.8)	15 (65.2)	0.031[b]
No	6 (85.7)	1 (14.3)	
Shampoo treatment n (%)			
Yes	3 (27.3)	8 (72.7)	0.105[b]
No	11 (57.9)	8 (42.1)	
Immunmodulator treatment n (%)			
Yes	0	3 (100)	0.105[b]
No	14 (51.9)	13 (48.1)	
Cosmetic moisturiser n (%)			
Yes	5 (31.2)	11 (68.8)	0.070[b]
No	9 (64.3)	5 (35.7)	
Cosmetic soap n (%)			
Yes	7 (46.7)	8 (53.3)	1.000[b]
No	7 (46.7)	8 (53.3)	
Other cosmetic products n (%)			
Yes	2 (28.6)	5 (71.4)	0.399[b]
No	12 (52.2)	11 (47.8)	

[b]Chi-square test/Fisher's exact test.

factors like Malassezia species, genetic predisposition, and hormonal influences, the contribution of contact allergens is still unknown.[4] This study aimed to investigate the role of contact allergens, particularly in facial SD, by conducting patch tests on patients with facial SD and on healthy controls.

This study included 30 patients with facial SD and 30 healthy individuals as the control group. The patients' disease characteristics, treatments and reactions to patch test allergens were recorded and analysed. The results revealed a greater number of suspicious reactions to both standard and cosmetic series patch tests in the SD patient group compared to the control group, indicating a potential association between contact allergens and facial SD. This suggests that patients with SD may exhibit greater sensitivity to certain allergens compared to healthy individuals. However, positive reactions to standard and cosmetic series patch tests in the patient and the control group, were not statistically significantly different from each other. Therefore, it is not possible to establish a direct association between contact allergens and SD.

In a case-control study by Ljubojevic et al.[5], 66% of SD patients, treated with topical corticosteroids, 34% of SD patients with no prior topical corticosteroid treatment, and 10% of the control group, demonstrated a positive reaction for baseline series allergens. Additionally, 3% of SD patients who had previously used topical corticosteroids exhibited a positive reaction to the individual corticosteroid series, whereas none of the SD patients without prior topical corticosteroid treatment or any individuals in the control group showed a positive reaction.[5] Their study highlighted that chronic corticosteroid use not only complicates SD but also predisposes patients to sensitization to baseline allergens and individual corticosteroid preparations. These results suggest that long-term topical treatments may exacerbate allergic sensitivities, further complicating SD management. These findings support the results of our study, as a statistically significant increase in suspicious reactions to standard series patch test allergens was observed in individuals who had used topical corticosteroids.

Moreover, the study by the North American Contact Dermatitis Group (2001-2016), highlights the co-occurrence of SD and allergic contact dermatitis. Patients with SD exhibited distinct allergen profiles, with the most common allergens including nickel sulfate, fragrance mix I, methylisothiazolinone, and Myroxylon pereirae resin. Interestingly, SD patients referred for patch testing demonstrated a lower rate of allergic contact dermatitis compared to non-SD patients. However, they still exhibited significant allergic sensitivity, particularly to fragrance components. Nickel sulfate was the most prevalent allergen, likely due to its widespread presence in everyday items like jewelry.[6] These findings align with our study's results of increased suspicious reactions to patch tests in SD patients, suggesting that exposure to cosmetic and topical products may exacerbate SD.

In a case-control study including children with atopic dermatitis and SD, a low prevalence of contact allergy was found in children with SD, with positive patch tests in only 6.7% of cases, predominantly to nickel sulfate. In comparison, children with atopic dermatitis showed a significantly higher rate of contact allergy. In fact, the odds ratio for developing a delayed-type hypersensitivity reaction was 11.5 times significantly lower in SD patients than in children with atopic dermatitis, indicating a significantly reduced risk of contact allergies in the SD group.[7]

Interestingly, while the rate of positive reactions to cosmetic allergens in our study was not statistically significant, the higher prevalence of suspected reactions, suggests a potential subclinical sensitivity. The prevalence of suspicious reactions to the cosmetic series patch test allergens in the patient group suggests that cosmetic products may trigger or exacerbate facial SD. Moreover, a statistically significant difference in adverse reactions between patients who used topical

corticosteroids and those who did not is observed, implying a potential link between topical corticosteroids and allergic reactions in facial SD patients. Ljubojevic et al.[5] findings reinforce the importance of patch testing in persistent or treatment-resistant SD cases, advocating for the inclusion of both standard allergens and patient-specific cosmetic or corticosteroid formulations in the diagnostic process. This approach could identify allergens that might otherwise go undetected using a standard series alone.

CONCLUSION

This study's approach to assessing patients' characteristics, treatments, and allergic reactions provides insight into the role of contact allergens. Overall, while this study emphasizes the relevance of ambiguous reactions to patch tests in SD, the absence of significant differences in positive reactions necessitates cautious interpretation. It is not possible to establish an association between contact allergens and SD. Larger-scale, controlled studies with a longitudinal design are necessary for further exploration of the effect of contact allergens on SD.

MAIN POINTS

- Higher rates of suspicious reactions to both standard and cosmetic series patch tests in the patient group indicate a potential association between contact allergens and facial seborrheic dermatitis (SD).
- Positive reactions to standard and cosmetic series patch test allergens in the patient, and control group were not statistically significant differences observed. It is not possible to establish an association between contact allergens and SD.
- The prevalence of suspicious reactions to the cosmetic series patch test allergens in the patient group suggest that cosmetic products may trigger or exacerbate facial SD.
- Greater numbers of adverse reactions in patients who used corticosteroid cream treatment, implies a potential link between topical corticosteroids and allergic reactions in facial SD patients.

ETHICS

Ethics Committee Approval: Ethical approval for this study was obtained from the University of Health Sciences Türkiye, Ankara Training and Research Hospital Non-Interventional Clinical Research Ethics Committee (approval number: 1312/2023, date: 06.09.2023).

Informed Consent: It wasn't obtained.

Footnotes

Authorship Contributions

Surgical and Medical Practices: G.Ü., N.K., Concept: G.Ü., İ.K., Design: G.Ü., N.K., Data Collection and/or Processing: G.Ü., İ.K., N.K., Analysis and/or Interpretation: İ.K., N.K., Literature Search: G.Ü., İ.K., Writing: İ.K., N.K.

DISCLOSURES

Conflict of Interest: No conflict of interest was declared by the authors.

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