

To Study Clinical Profile and Role of Patch Testing and Histopathological Microscopic Examination in Contact Dermatitis (CD) Due to Use of Cosmetics

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Conflict of interest: Nil

Abstract:

Background & Methods: The aim of the study clinical profile and role of allergens patch testing and histopathological microscopic examination in Contact Dermatitis(CD) due to use of cosmetics. A detailed history of the patients included in the study was taken. Duration and the type of occupation were noted for occupational cases of CD. Morphology of the lesions and the sites of involvement were noted down. History, symptoms and signs suggestive of Atopy were noted down. Past history of the patient for similar complaints were asked for. History of any drug intake prior and after onset of lesions is noted down. All the patients were subjected to blood investigations namely routine hemogram and blood sugar.

Results: The chi-square statistic is 11.4301. The p -value is .022133. The result is significant at $p < .05$.

Conclusion: We conclude that necessity for patch testing with concomitant histopathological examination and careful use of cosmetics in India. Recent studies suggest increased incidence of cosmetic dermatitis and also of newer antigens that cause allergies. Patch testing along with concomitant histopathological examination is an important investigation in patients with suspected allergic contact in a growing economy like that of India where the market for cosmetics especially fairness creams and hair cosmetics is in high demand, the reports on cosmetic dermatitis are insignificant. The authors would like to make more detailed analysis and interpretation of their study to emphasize the importance of patch testing in all suspected cases and recommend use of the suspected cosmetic itself for patch testing.

Keywords: Clinical, Allergens, Cosmetic, & Dermatitis.

Study Design: Observational Study.

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Introduction

The term 'cosmetics' is defined as products for external use, intended to protect or beautify different parts of the body. The Food and Drug Administration (FDA) defines them as articles that can be applied to the human body for cleaning, beautifying, highlighting features, changing appearance, or even as components of any of these products, with the exception of soaps [1]. In accordance with the European legislation, the term is used for a substance or mixture of substances intended for application on the external surfaces of the body (skin, hair, nails, lips, and genitalia), teeth and/or oral mucosa, with the purpose of cleaning, odorization, modification of appearance, or correction of odours in the region of use [2]. Thus, this term varies according to the legislation of each country and includes makeup, skin care items, perfumes, hair and nail products, shaving gels or

creams, and any personal care products, such as toothpaste and deodorants [3]. Cosmetics are part of the daily life of the population, being more used by women, who, on average, apply about 12 products per day, which can contain up to 168 different components, while men use up to six products with an average of 85 components [4]. Although the most common adverse effects caused by the use of cosmetics are irritant contact dermatitis, allergic contact dermatitis (ACD) also occurs, corresponding to about 1% of the reactions. The incidence of ACD varies according to the region, frequency of use of cosmetics, allergenic power of the products used, and access to patch tests (which confirm the diagnosis). The risk factor for its occurrence is the increase in the use of cosmetics; thus, the population most affected is females between 20 and 55 years of age. It is difficult to

estimate the frequency of this condition, since most individuals do not seek medical services when experiencing such reactions and discontinue the use on their own [5]. Hygiene products and moisturizers are the main responsible for the cases of CD due to allergic and irritant reactions to cosmetics, followed by makeup, hair products, and nail products. The main associated allergens are fragrances and preservatives [6].

Material and Methods

This study was conducted at Maharishi Markandeshwar College of Medical Sciences and Research, Ambala for 01 Year. A detailed history of the patients included in the study was taken. Duration and the type of occupation were noted for occupational cases of CD due to allergic and irritant reactions caused by cosmetics. Morphology of the lesions and the sites of involvement were noted down. History, symptoms and signs suggestive of Atopy were noted down. Past history of the patient for similar complaints were asked for. History of any drug intake prior and after onset of lesions is noted down. All the patients were subjected to blood investigations namely routine hemogram and blood sugar. Based on the type and nature of exposure to a specific occupation or antigen, the patients were

patch tested with the appropriate antigens/chemical irritants and concomitant histopathological microscopic examination.

Histopathological examination of tiny punch biopsies of respective skin lesions caused by use of cosmetics is also an important investigation to add the diagnostic strength to patch testing. Punch biopsies of the skin lesions of all patients were taken, formalin fixed paraffin embedded slides prepared and stained with haematoxylin and eosin (H&E) and studied under light microscopy. The results of this microscopic study exclusively supported the patch testing in diagnosing contact dermatitis due to cosmetic use.

Patch Test Concentrations:

The concentrations used for patch testing are usually much higher than those encountered during development of dermatitis. No chemical or substance should be applied to the skin until full details of its composition and potential irritancy or toxicity are known, If doubt about the optimum level of testing, it is advisable to start at a low and increase concentration gradually.

Table 1: Footwar series

FOOTWEAR SERIES

COMPOUND	Conc. Veh. %(w/w)
1. Formaldehyde	2%
2. Mercaptobenzothiazole	1%
3. Potassium Bichromate	0.1%
4. Nickel Sulphate	5%
5. Colophony	10%
6. Epoxy resins	1%
7. Neomycin sulphate	20%
8. Hydroquinone	1%
9. Thiuram Mix	1%
10. Black Rubber	0.60%
11. Kathon CG	1.3%
12. Glutaraldehyde	0.20%
13. Dioctyl Phthalate	5%
14. Disperse Orange	1%
15. Disperse Blue	1%

Table 2: Cosmetic and fragrance series
COSMETIC AND FRAGRANCE SERIES

COMPOUND	Conc. Vch.%(w/w)
1. Vaseline	100%
2. Ethylenediamine	1%
3. Benzyl alcohol	1%
4. Benzyl Salicylate	2%
5. Bronopol	0.30%
6. Butyl Hydr.(BHA)	2%
7. Butyl Hydr.(BHT)	2%
8. Cetyl Alcohol	5%
9. Chloroacetamide	0.20%
10. Geranium oil	2%
11. 2-hydr-4meth. Bethbenz	2%
12. 2(2-Hydr-5- Meth Benzotriazole	1%
13. Imidazolidinylurea(germall 115)	2%
14. Isopropyl Myristate	20%
15. Jasmine absolute	2%
16. Lavender absolute	2%
17. Musk Mix	5%
18. Phenyl salicylate	1%
19. Polyoxyethyleneso oleate(Tween 80)	2%
20. Rose Oil	2%
21. Sorbitan Sesquio(ARKACEL-83)	2%
22. Thiomersal	0.10%
23. Triclosan	2%
24. Triethanolamine	2%
25. Vanillin	2%
26. Cetrimide	0.50%
27. Hexamine	2%
28. Chlorhexidine Diglucosate	0.50%
29. Diazolidinylurea (Germall II)	2%
30. Propylene Glycol	5%
31. Kathon CG	1.3%
32. Sorbic Acid	2%

100 cases of contact dermatitis studied by histopathology testing of formalin fixed paraffin embedded (FFPE) haematoxylin and eosin (H&E) stained slides.

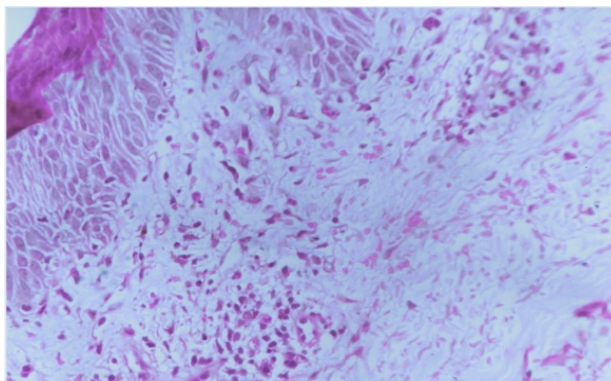


Figure 1: 40X magnification showing microscopic picture of contact dermatitis

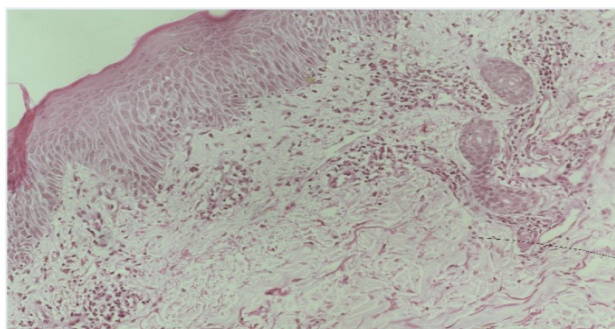


Figure 2: 20X magnification showing microscopic picture of contact dermatitis

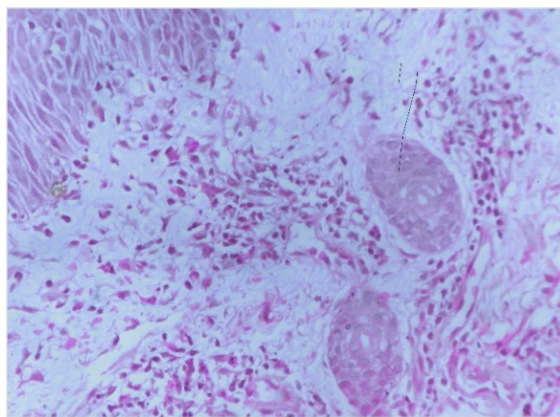


Figure 3: 40X magnification showing microscopic picture of contact dermatitis

Result

Table 3: Gender Distribution

S. No.	Gender	No.	Percentage
1	Male	71	71
2	Female	29	29

Table 4: Allergen to be tested positive

S. No.	Allergen	No.	Percentage	P Value
1	Potassium dichromate	57	57	.000492
2	Nickel	12	12	
3	Formaldehyde	09	09	
4	Cobalt chloride	13	13	
5	Epoxy resin	05	05	
6	Parabens	04	04	

The chi-square statistic is 15.2334. The p -value is .000492. The result is significant at $p < .05$.

Table 5: Atopic individuals

S. No.	Atopic individuals (No. =10)	No.	Percentage	P Value
1	Nickel	06	06	.490153
2	2+ positivity	02	02	
3	1+ positive	01	01	
4	3+ positive	01	01	

The chi-square statistic is 0.4762. The p -value is .490153. The result is *not* significant at $p < .05$.

Table 6: Contact dermatitis

S. No.		No.	Percentage	P Value
1	Cement tops	43	43	.022133
2	Nickel	13	13	
3	Plant antigens	11	11	
4	Paint	06	06	
5	Kumkum	05	05	
6	Rubber	05	05	
7	Leather	04	04	
8	Oil and Grease	04	04	
9	Turmeric	03	03	
10	Miscellaneous	06	06	

The chi-square statistic is 11.4301. The p -value is 0.022133. The result is significant at $p < .05$.

Discussion

The face is the most frequently involved site of contact dermatitis due to cosmetic use [7]. In this study, face was involved in 56% of cases followed by face along with neck in 10%, face and hands in 8%, and only hands in 6%. Other sites included neck (4%) and scalp (4%). Face was the most common site affected in both males (47.37%) and females (61.29%). Face and neck (21.05%) and scalp (10.53%), the sites for hair dye allergy, were commonly involved in males, whereas hands (9.68%) were exclusively involved in females [8].

de Groot et al. [9] found that the most frequently reported objective symptom was erythema (61%) followed by scaling (19.3%) and pimples (14.2%). In our study, erythema (52%) was the most common objective symptom followed by papules in 40% and scaling in 34%. [10] Other common primary lesions included plaques (20%), macules (18%), vesicles (10%), and pustules (6%). Secondary lesions commonly seen included hyperpigmentation (28%), crusting (12%), hypopigmentation (10%), and excoriation (10%). Soap was the most common cosmetic used in both males (84.21%) and females (100%). Other commonly used cosmetics included face creams (50%), shampoos (64%), perfumes (38%), and bindi/sindoor/kumkum (32%). The prevalence of face cream usage was high in the females of the study group (70.97%), whereas hair dye usage was common in males (52.63%).

Mehta and Reddy [11] in their study on the pattern of cosmetic sensitivity in Indian patients reported that bindi, hair dye, and face creams were the most commonly suspected cosmetics in contact dermatitis due to cosmetics. In our study, face creams (30%), hair dyes (16%), and soaps (14%) were the most frequently suspected cosmetics. Males (42.11%) commonly suspected allergy to hair dye whereas females (45.16%) suspected allergy to face cream. The incidence of suspected allergic contact dermatitis was the highest among hair dye users (80%). High incidence was also seen in users of face creams (60%), shaving creams (46.15%), and perfumes (26.32%).

Conclusion

We conclude that necessity for patch testing with concomitant histopathological examination and careful use of cosmetics in India. Recent studies suggest increased incidence of cosmetic dermatitis and also of newer antigens that cause allergies and

irritations. Patch testing is an important investigation in patients with suspected allergic contact in a growing economy like that of India where the market for cosmetics especially fairness creams and hair cosmetics is in high demand, the reports on cosmetic dermatitis are insignificant. The authors would like to make more detailed analysis and interpretation of their study to emphasize the importance of patch testing in all suspected cases and recommend use of the suspected cosmetic itself for patch testing.

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