International Journal of Research in Dermatology
Goel S et al. Int J Res Dermatol. 2019 May;5(2):350-356
http://www.ijord.com

DOI: http://dx.doi.org/10.18203/issn.2455-4529.IntJResDermatol20191761

Original Research Article

Study of the clinical pattern of contact dermatitis over the face and its correlation with patch testing

Saumya Goel, Vinma H. Shetty*, Hafsa Eram, Amita Murali Babu

Department of Dermatology, Venereology and Leprosy, A. J. Institute of Medical Sciences, Kuntikana, Mangalore, Karnataka, India

Received: 21 December 2018
Revised: 08 March 2019
Accepted: 14 March 2019

***Correspondence:**
Dr. Vinma H. Shetty,
E-mail: vinma_shetty@yahoo.co.in

ABSTRACT

Background: Contact dermatitis (CD) is an altered state of reactivity; occur due to direct contact with noxious agents in our environment. Face is a very common site for CD.
Methods: Prospective hospital based study was conducted at A. J. Institute of Medical Sciences, Mangalore from June 2018 to November 2018. Fifty cases aged above 18 years with suspected allergic contact dermatitis (ACD) over face who gave written informed consent were enrolled. A complete history was taken and detailed clinical examination was done. Patch testing was done over the back in all patients which was removed after 48 hours and positive result was recorded based on the recommendation of the international Contact Dermatitis Research Group (ICDRG).
Results: The most common clinical pattern observed was pigmented contact dermatitis(PCD) (70%), followed by irritation (6%), acneiform eruptions (5%) and contact urticaria (2%). Out of 50 patients, 20 patients developed CD to fragrances and perfumes. 14 patients developed to soaps and shampoos. On patch testing, most common allergen in fragrances/perfumes was fragrance mix (52.9%). In soaps and shampoos it was triclosan (68.4%), parabens (31.5%). Sesquiterpene lactone in parthenium plant (4%), Paraphenylenediamine in hair dye (8%). In face creams were gallate mix and cetrimide among metals, nickel and chromium (6%). In case of kumkum it was paraphenylenediamine (4%).
Conclusions: Amongst the various patterns of contact dermatitis, PCD to cosmetics, fragrances and daily care products was most common pattern observed and the main allergens were triclosan, fragrance mix and balsum of Peru.

Keywords: Contact dermatitis, Face, Patch test

INTRODUCTION

Contact dermatitis (CD) is an altered state of reactivity, an inflammatory skin reaction which occur due to direct contact with noxious agents in our environment.[1] It may be irritant or allergic in nature. Damage of the tissue by allergic substance is mediated through immunologic mechanism and is characterized by presence of erythema, swelling, papules and papulovesicles. In severe cases vesiculation and bullae are seen in exposed areas, if they burst, a weeping dermatitis occurs. Repeated or continuous exposure of sensitized individuals to allergens results in chronic diseases, which is characterized by lichenification, hyperkeratosis, scaling and fissuring.[2,3]

Clinical variants of contact dermatitis over the face include Pigmented contact dermatitis (PCD) or cosmetic

dermatitis, contact urticaria, lichenoid eruptions, acneiform eruptions, irritation.

Some of the etiological factors for contact dermatitis over the face are pigmented contact dermatitis and contact chelitis, airborne contact dermatitis (ABCD), dermatitis from topical medicaments (like neomycin, framycetin, antiseptics, parabens, corticosteroids), dermatitis due to metals (caused by nickel, chromates, and mercury), rubber dermatitis, plastic dermatitis, clothing dermatitis, minor compositae-induced dermatoses and occupational contact dermatitis.

The aim of the study was to study the clinical pattern of contact dermatitis over the face in patients presenting to our tertiary health care center and to correlate these clinical patterns observed by patch testing.

METHODS

This was a prospective hospital based study conducted at Department of Dermatology of A. J. Institute of Medical Sciences, Mangalore from June 2018 to November 2018.

Fifty cases who presented to us with suspected allergic contact dermatitis over the face who gave written informed consent were enrolled in this study.

Inclusion criteria

Inclusion criteria were patients presenting with allergic contact dermatitis; patients giving consent for patch testing; patients above 18 years of age group.

Exclusion criteria

Exclusion criteria were patients with irritant reactions; pregnant and lactating women; patients with disseminated lesions; patients not giving consent.

The patients were explained regarding the objectives as well as the method of the study and the consent was taken. A complete history was taken regarding the symptoms and patients were asked about history of contact with any agents like perfumes, cosmetics, fragrances, any unknown topical, duration of its use, frequency of application, any aggravating and relieving factors on exposure to allergen was noted. Detailed clinical examination was done which included distribution and morphology of lesions and presence of secondary infection and biopsy was done wherever it was necessary.

Patch testing

Patch testing was done in all the patients using the Indian Standard Series[4] and Indian Cosmetic and Fragrance Series[5] as per the recommendations of CODFI (Contact and Occupational Dermatoses Forum of India).

The kit comprised of microporous tape (15×15 cm) and aluminium patch test chamber. Aluminium patch test chambers with an internal diameter of 9mm and a depth of 0.7 mm were used. The test chambers were placed facing up with 2 cm distance from centre of each other. It was stored at room temperature.

After explaining the procedure in detail, informed written consent was taken. Allergens were taken out of the refrigerator prior to testing. The back of the patient was gently cleaned with spirit and the kits were tapped over the back in vertical rows starting from left scapular region for a period of 48 hours. The test area was marked with a black coloured ink. Patients were advised to avoid wearing tight clothes, to avoid excessive exercise, rubbing, scratching or wetting the area. The patch test unit was removed from the back after 48 hours and the readings were taken one hour after the removal.

Positive result was recorded based on the recommendation of the international Contact Dermatitis Research Group (ICDRG) (Table 1).

Table 1: The international contact dermatitis research group (ICDRG) system for clinical scoring of allergic patch test reactions.

Reaction	Definition
+?	Doubtful reaction; faint macular erythema only
+	Weak positive reaction; erythema, infiltration papules
++	Strong positive reaction; erythema, infiltration, papular, vesicles
+++	Extreme positive reaction; intense erythema, infiltration and coalescing vesicles
-	Negative reaction
IR	Irritant reaction
NT	Not tested

The diagnosis of allergic contract dermatitis was confirmed based on a positive patch test to an allergen.

Statistical analysis

Software (SPSS, version 16.0 statistical package, IBM Corporation, Armonk, NY, USA) was used throughout.

RESULTS

Out of Fifty patients who were included in the study, 20 (40%) were males and 30 (60%) were females. Male to female ratio was 2:3.

Out of 50 patients, majority (57% of patients) belonged to age group of 40-50 years while the next common age group was 30-40 years (28% of patients) (Table 2).

Table 2: Age and sex distribution in the study population.

Age group (in years)	No. of male patients	No. of females patients	Total
18-30	3	3	6
30 - 40	5	9	14
40 - 50	10	17	27
Above 50	2	1	3
Total	20	30	50

Amongst the patients, the most common clinical pattern observed was pigmented contact dermatitis seen in 70% of the patients, which was followed by irritation in 6% of the patients, acneiform eruptions in 5% of the patients. Contact urticaria was seen in only 2% of the patients (Table 3).

Table 3: Clinical pattern of contact dermatitis among the patients.

Clinical pattern	No. of patients	Percentage (%)
Pigmented contact dermatitis	35	70
Contact urticaria	2	4
Lichenoid eruptions	2	4
Acneiform eruptions	5	10
Irritation	6	12

Amongst these various agents, soaps and shampoos were the most commonly used agents in 91% of the patients both male as well as females, this was followed by use of perfumes and fragrances in 87% of the patients and facial cosmetics like face creams, shaving creams, lipsticks in 81% of the patients. Other commonly used agents were metals in form of earrings, nose pins and kumkum / bindi in case of female patients and hair dye and history of contact plants mainly in male patients.

Table 4: Number of patients showing contact dermatitis to various agents.

Agents	No. of patients	Percentage (%)
Soaps / shampoos	14	28
Fragrances / perfumes	20	40
Parthenium plant	3	6
Hair dyes	3	6
Face creams	5	10
Metals	4	8
Kumkum	1	2

Out of 50 patients, 20 patients (40%) developed contact dermatitis due to use of fragrances and perfumes. The second commonest agents responsible for causing reactions over the face was soaps and shampoos in 14 patients (28%). Kumkum was least common agent responsible for causing contact dermatitis in 2% patients (Table 4).

Table 5: Percentage of patients showing positive patch test to various allergens present in the agents.

Agents	Allergens	No. of patients (patch test positive)	Percentage (%)
Soaps/ shampoos	Triclosan, parabens	19	38
Fragrances/ perfumes	Fragrance mix, balsum of peru, formaldehyde, paraben, quaternium-15	17	34
Parthenium plant	Sesquiterpene lactone	2	4
Hair dyes	Paraphenylenediamine and gallate mix	4	8
Face creams	Gallate mix and cetrimide	3	6
Metals	Nickel and chromium	3	6
Kumkum	Paraphenylenediamine.	2	4

The most common allergen in fragrances or perfumes were fragrance mix, balsum of peru, formaldehyde, paraben, quaternium-15 and showed positive patch test in 17 patients (34%). Out of 17 patients, 9 patients tested positive for fragrance mix, 6 patients were positive for balsum of peru while only 2 patients tested positive for preservatives like formaldehyde, paraben, quaternium-15.

Allergens most commonly responsible for causing contact dermatitis in soaps and shampoos were triclosan, parabens. Out of the 19 patients, 13 patients were positive for triclosan while 6 patients were positive for parabens.

In case of parthenium plant allergen was sesquiterpene lactone and was positive for patch test in 4% of the patients.

Paraphenylenediamine and gallate mix was the most common allergen used in hair dye in 8% of the patients.

Most common allergen used in face creams were gallate mix and cetrimide. Out of the 3 patients 2 patients were positive for cetrimide while 1 patient was positive for gallate mix.

Nickel and chromium was most common allergens observed in various earrings and nose pins in 6% of the patients.

In case of kumkum / bindi it was paraphenylenediamine which showed positive result in 2 patients (4%). (Table 5, Figure 1).

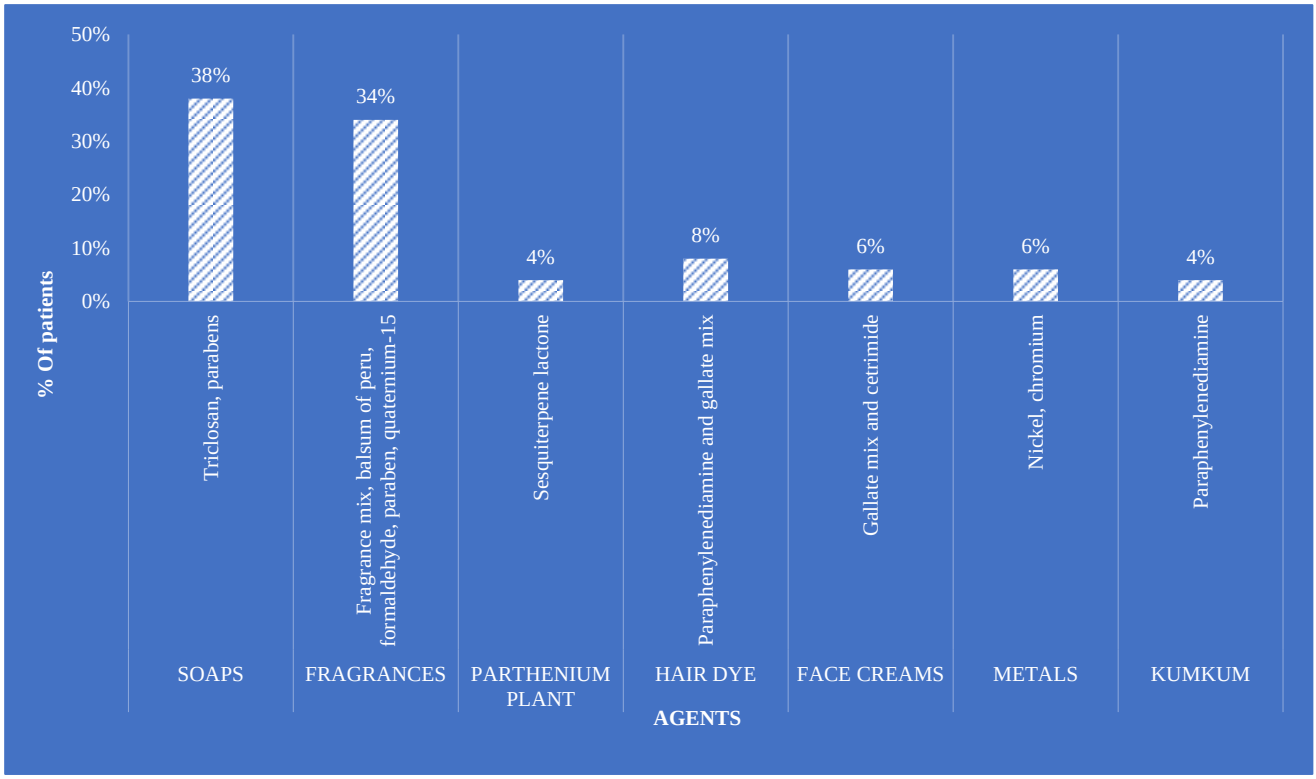

Figure 1: Graphical representation of the patients showing positive patch test to various allergens present in the agents.

Figure 2: Patient with allergic contact dermatitis: (A) tested positive to fragrance mix; (B) positive for sesquiterpene lactone to parthenium plant; (C) tested positive for paraphenylenediamine to hair dye.

DISCUSSION

An eczematous reaction is an inflammatory intolerance response characterized by successive and coexistent erythema, blisters, exudation, papules, and flaking. The term "dermatitis" is generally used as a synonym for "eczema".

CD is an inflammatory skin disease characterized by pruritus, erythema, vesicles, and scale. It can present as acute, subacute, or chronic dermatitis. A total of 80% of CD cases are irritant contact dermatitis (ICD), and 20% of CD cases are allergic contact dermatitis (ACD). ICD is defined as a localized, nonimmunologically driven, inflammatory reaction. ACD is a type 4 mediated

hypersensitivity reaction which occurs on exposure to an exogenous agent or substance which in turn o results in an inflammatory reaction.[6] It is a chronic problem that affects people irrespective of their age sex or race. ACD should be suspected and patients should be evaluated for any generalised or localised skin eruptions (such as the hands, face, eyelids), which may indicate contact with substances in the environment.[7]

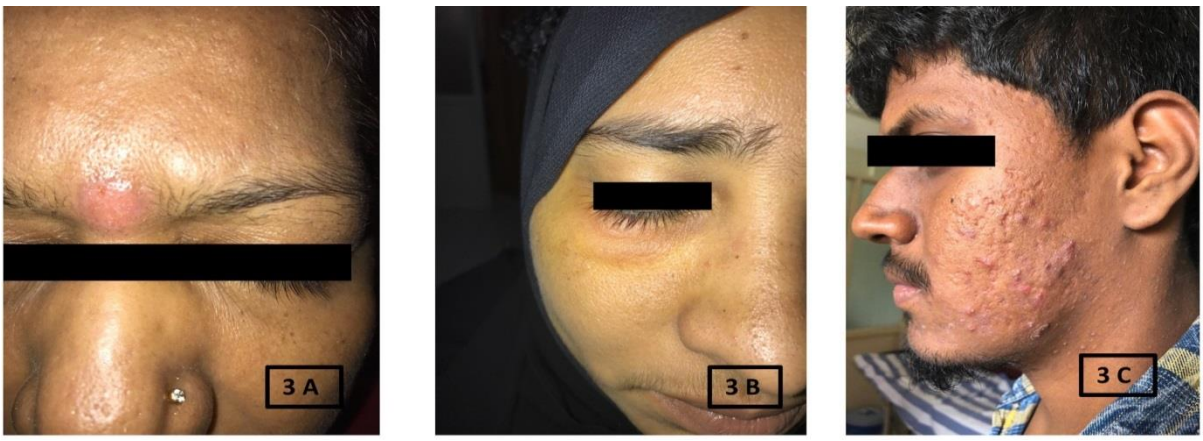

Figure 3: Patient with allergic contact dermatitis: (A) tested positive for paraphenylenediamine to kumkum; (B) patient with contact urticaria; (C) patient with acneiform eruption.

Figure 4 (A-C): Patient with pigmented contact dermatitis.

Figure 5: Patch test: (A) positive for fragrance mix; (B) patch test positive for nickel sulphate.

The gold standard for diagnosis of ACD is the Patch test (PT). Patients with acute, subacute, and chronic eczematous dermatitis, such as erythema, edema, weeping, crusting, scaling, hyperkeratosis, and lichenification, are likely to have the highest yield for Patch Tests.[8]

In our study 50 patients were included 20 patients were male while 30 were females. The male: female ratio was 2:3. Laguna et al in their study reported Male: Female ratio to be 1:5.3, this was similar to our study where number of females were more as compared to males.[9] This could be due to peer pressure over the female to look good.

Various studies have showed cosmetics to be most important etiological factor for causing contact dermatitis. In a study done by Duarte and Campos-Lage they found 87% female patients in their private practice with complaints of reaction to 7 cosmetics.[10] Kohl et al in their study reported 300 patients with 8 cosmetic ingredient allergies.[11] They found positive patch tests to fragrances in 54% and preservatives in 32% of patients. de Groot et al. [12] from Netherlands identified 119 patients with contact 9 allergy to cosmetic products.

This was similar to your study, 70% of the patients presented to us with pigmented contact dermatitis and about 12% of the patients complained of irritation. 10% developed acneiform eruptions and all these gave history of contact with various cosmetics products and fragrances. Only 4% patients developed contact urticaria and lichenoid lesions.

Amongst the various agents, soaps and shampoos were the most commonly used agents in 91% of the patients both male as well as females, this was followed by use of perfumes and fragrances in 87% of the patients and facial cosmetics like face creams, shaving creams, lipsticks in 81% of the patients.

In our study amongst the various agents, majority of the patients (40%) developed contact dermatitis to fragrances and perfumes. The second commonest agents were soaps and shampoos in 14 patients (28%). This was followed by facial cosmetics, creams (10%), metals like nickel and chromium (8%), hair dye and parthenium plants both in 6% of the patients. Kumkum (2%) was the least common agent which led to developed of contact dermatitis.

In our study on patch testing, most common allergen observed in fragrances and perfumes was fragrance mix in 52.9% of the patients. This was followed by balsum of Peru in 35.2% of the patients. Preservatives like formaldehyde, paraben, quaternium-15 were the next common allergen reported to be positive for patch test in 11.7% of the patients.

While in case of soaps and shampoos, patch test was positive for parabens and triclosan. Out of the two, triclosan was the most common allergen. Amongst facial creams, cetrimide and gallate mix was the most common allergen in our study. It was positive in 6% of the patients.

This was similar to the various other studies which states fragrances and preservatives to be the most common allergens in cosmetics. Such that fragrances accounts for around 30-40% of the allergic reactions to cosmetics.[13,14] The fragrance mix (FM) I in standard series PTs contain 8 perfume components[26] and can detect 70% to 80% of all perfume allergies.[15] *Myroxylon pereira* (balsam of Peru) is a naturally occurring fragrance material that is the second most common allergen identified by the North American Contact Dermatitis Group.[16]

Preservative are classified as formaldehyde and formaldehyde releasers (including imidazolidinyl urea, quaternium 15, etc) and nonformaldehyde releasers. These are found in various baby products, bath products (soaps, detergents, bubble baths), makeup (eyeliners, makeup remover, blushes, face powders), hair care products (shampoo, conditioners, sprays, straighteners, rinses, wave sets), hair-coloring products (dyes and colors, tints, bleaches), nail care products, deodorants, shaving products, skin care products, suntan products, and sunscreens among others.[17]

A definite causal link was observed in some of the studies such as face cream with gallate mix, shaving cream with gallate mix and cetrimide, hair dye with paraphenylenediamine, and perfume with thiomersal. Propyl gallate is an allergen in liposome containing skin creams. The majority of allergy to hair dyes is caused by PPD.[18]

In our study, PPD was the most common allergen in patients using hair dye (8% of the patients). While in patients using kumkum, it was PPD (4% of the patients). Among the metals, common allergen was nickel and chromium (6% of the patients). In case of parthenium plants, common allergen was sesquiterpene lactone (4% of the patients).

In a study done by Mehta and Reddy on the pattern of cosmetic sensitivity in Indian patients they reported bindi, hair dye, face creams to be the most common suspected cosmetics in contact dermatitis due to cosmetics.[19]

In India, *Parthenium hysterophorus* is perhaps the most common cause of contact dermatitis/airborne contact dermatitis, with an element of photosensitivity in some cases.[20]

Goh et al in their study reported three cases of PCD due to kumkum.[21] Patch test revealed positive reactions to kumkum powder in all the three cases and also to dyes in one case and cananga oil in another case. Kumar et al reported pigmentation following the use of "bindi;" however, the patch test was negative in these patients.[22]

CONCLUSION

Contact dermatitis is an inflammatory skin disease characterized by pruritus, erythema, vesicles, and scale. The gold standard for diagnosis of Allergic Contact Dermatitis is the Patch test. Labelling of the ingredients in all the skin care products should be mandatory and should be strictly regulated. Amongst the various patterns of contact dermatitis, pigmented contact dermatitis due to cosmetics, fragrances and daily care products was the most common pattern observed and the main allergens causing contact dermatitis were triclosan, fragrance mix and balsum of Peru.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Lachapelle JM. Historical Aspects. In: Rycroft RJG, Menne T, Frosch PJ, Lepoittenevin JP, eds. Textbook of Contact Dermatitis, 3rd ed. Berlin: Springer; 2001: 3-9.
2. Beck MH, Wilkinson SM. Contact dermatitis: Allergic. In: Tony Burns, Stephen Breathnach, Christopher Griffiths et al. Rook's text book of Dermatology. 7th ed. Blackwell sciences; 2004: 20.
3. Sharma VK, Sethuram G, Garg T, Verma KK. Patch testing with the ISS in New Delhi. Contact dermatitis. 2004;51:319-21.
4. Narendra G, Srinivas CR. Patch testing with Indian standard series. Indian J Dermatol Venereol Leprol. 2002;68:281-2.
5. Kumar P, Paulose Ra. Patch Testing in Suspected Allergic Contact Dermatitis to Cosmetics. Dermatol Res Prac. 2014;2014:695387.
6. Bolognia J, Jorizzo J, Schaffer J. Dermatology. Elsevier Saunders, Philadelphia, PA; 2012.
7. Fonacier L, Bernstein DI, Pacheco K, Holness DL, Blessing-Moore J, Khan D, et al. Contact dermatitis: a practice parameter-update 2015. J Allergy Clin Immunol Pract. 2015;3:S1–S39.
8. Johansen JD, Aalto-Korte K, Agner T, Andersen KE, Bircher A, Bruze M, et al. European Society of Contact Dermatitis guideline for diagnostic patch testing—recommendations on best practice. Contact Dermatitis. 2015;73:195–221.
9. Laguna C, de la Cuadra J, Martín-González B, Zaragoza V, Martínez-Casimiro L, Alegre V. Allergic contact dermatitis to cosmetics. Actas Dermosifiliogr. 2009;100:53-60.
10. Duarte I, Campos-Lage A. Frequency of dermatoses associated with cosmetics. Contact dermatitis. 2007;56:211.
11. Kohl L, Blondeel A, Song M. Allergic contact dermatitis from cosmetics. Dermatology. 2002;204:334.
12. de Groot AC, Bruynzeel DP, Bos JD, van der Meeren HL, van Joost T, Jagtman BA, et al. The allergens in cosmetics. Arch Dermatol. 1988;124:1525.
13. Davies RF, Johnston GA. New and emerging cosmetic allergens. Clin Dermatol. 2011;29:311–5.
14. Hamilton T, de Gannes GC. Allergic contact dermatitis to preservatives and fragrances in cosmetics. Skin Therapy Lett. 2011;16:1–4.
15. Frosch PJ, Rastogi SC, Pirker C, Brinkmeier T, Andersen KE, Bruze M, et al. Patch testing with a new fragrance mix—reactivity to the individual constituents and chemical detection in relevant cosmetic products. Contact Dermatitis. 2005;52:216–25.
16. Salam TN, Fowler JF Jr. Balsam-related systemic contact dermatitis. J Am Acad Dermatol. 2001;45:377–81.
17. Castanedo-Tardana MP, Zug KA. Methylisothiazolinone. Dermatitis. 2013;24:2–6.
18. Rietschel RL, Fowler JF. Allergy to preservatives and vehicles in cosmetics and toiletries. In: Rietschel RL, Fowler JF, editors. Fisher's Contact Dermatitis. 5th edition. Philadelphia, Pa, USA: Lippincott Williams & Wilkins; 2001: 211–259.
19. Mehta SS, Reddy BSN. Pattern of cosmetic sensitivity in Indian patients. Contact Dermatitis. 2001;45(5):292–3.
20. Bhutani LK, Rao DS. Photocontact dermatitis caused by Parthenium hysterophorous. Dermatologica. 1978;157:206-9.
21. Goh CL, Kozuka T. Pigmented contact dermatitis from 'kumkum'. Clin Exp Dermatol. 1986;11:603-6.
22. Kumar AS, Pandhi RK, Bhutani LK. Bindi dermatoses. Int J Dermatol 1986;25:434-5.

Cite this article as: Goel S, Shetty VH, Eram H, Babu AM. Study of the clinical pattern of contact dermatitis over the face and its correlation with patch testing. Int J Res Dermatol 2019;5:350-6.