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Clinico-Epidemiological Profile of Allergic Contact Dermatitis and Its Correlation with Patch Testing in a Tertiary Care Center

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Introduction:

Allergic Contact Dermatitis (ACD) is an acquired cutaneous inflammatory reaction caused by contact with a specific exogenous allergen to which a person was previously sensitized. ACD is a type IV delayed-type hypersensitivity response. It accounts for approximately 20% of new incident cases of contact dermatitis. Allergic contact dermatitis occurs more commonly seen in middle aged men due to their contact with allergens during occupation.1

Among multiple skin diseases found in India, allergic contact dermatitis (ACD) is one of the common skin problems found in patients attending the dermatology outpatient department. It is considered as the inflammation of the skin that clinically presents as varying degrees of erythema, edema, scaling, and/or vesiculation. It is a cell-mediated disease involving both the adaptive and innate immune systems and is the prototype of a delayed-type hypersensitivity reaction. It occurs more commonly in adults and up to 20% of the adult population is sensitized to one or more contact allergens. The diagnosis of ACD is relatively simple as it can be elucidated by clinical history and/or by a patch test.2

Patch testing is the diagnostic tool for allergic contact dermatitis. It has been a time-tested method which has been performed since the 19th century. Numerous contact dermatitis society and groups have been formed all over the globe to promote understanding, education and research on contact dermatitis.3

Material and Methods

This was a prospective observational study carried out in the department of dermatology in a tertiary care center. A total of 100 cases of ACD were included in the study. Patients clinically diagnosed to have ACD, willing to participate in the study, and agreeing to undergo patch testing were included in the study. Patients with any other pre-existing skin disorders, on immune suppressive therapy, pregnant women, lactating mothers, and patients who refused patch testing were excluded from the study.

All patients clinically suspected to have ACD were included in this study. A thorough history was documented with particular reference to duration, onset, the evolution of the symptoms, systemic disturbances, any pre-existing skin diseases, seasonal variation of the disease, site of involvement, the morphology of the lesion, distribution of lesion, and occupation of the patient. Any personal and/or family history of atopy was also noted down. Past history of similar symptoms was documented. Blood investigations such as routine hemograms and fasting blood sugar were advised whenever necessary. Based on the type of exposure to

allergens, the patients were patch tested with the appropriate antigens. The necessity and importance of the patch test were explained to the patients, and informed consent was taken. The patch testing was performed in the outpatient department using the antigens of the Indian Standard Series kit (Systopic Laboratories Pvt. Ltd., New Delhi, India), approved by the Contact and Occupational Dermatoses Forum of India (CODFI).

Result:

In our study, the majority of the patients (20%) were in the age group of 41 to 50 years followed by 51 to 60 years and 31 to 40 years which accounted for 19 % each. The mean age of the patients was 42.8 years. This study revealed ACD is more common in males (55%) than females (45%) with a male-to-female ratio of 1.22:1. Majority of patients (50%) belonged to the lower socio-economic status (LSES) group and most of the patients were from urban areas (72%) than rural areas (28%).

Table 1: List of allergens used in the patch test

Sr. No.	Name	Concentration in %
1	Petrolatum	100%
2	Wool alcohols	30%
3	Balsam of Peru	10%
4	Mercaptobenzothiazole	1%
5	Potassium dichromate	0.1%
6	Nickel sulfate	5%
7	Coblat Sulfate	5%
8	Colophony	10%
9	Epoxy resin	1%
10	Paraben mix	9%
11	Para-phenylenediamine	1%
12	Parthenium	15%
13	Neomycin sulfate	20%
14	Benzocaine	5%
15	Chlorocresol	1%
16	Formaldehyde	2%
17	Fragrance mix	8%
18	Thiuram mix	1%
19	Nitrofurazone	1%
20	Black rubber mix	0.6%

Based on the type of exposure to allergens, the patients were patch tested with the appropriate antigens. The necessity and importance of the patch test were explained to the patients, and informed consent was taken. The patch testing was performed in the outpatient department using the antigens of the Indian Standard Series kit (Systopic Laboratories Pvt. Ltd., New Delhi, India), approved by the Contact and Occupational Dermatoses Forum of India (CODFI).

Table 2: Distribution of cases as per the positive reaction to allergens (n=69)

Allergen	Frequency in numbers	Frequency in %
Wool alcohols	5	7.24
Formaldehyde	4	5.79

Mercaptobenzothiazole	1	1.44
Potassium bichromate	21	30.43
Nickel sulfate	13	18.84
Cobalt Sulfate	9	13.04
Colophony	4	5.79
Epoxy resin	3	4.34
Paraben mix	4	5.79
Para-phenylenediamine	15	21.73
Parthenium	18	26.08
Neomycin sulfate	2	2.89
Benzocaine	4	5.79
Chlorocresol	11	15.94
Fragrance mix	4	5.79
Thiuram mix	3	4.34
Nitrofurazone	3	4.34
Black rubber mix	10	14.49
Multiple allergens	36	52.17

Table 3: Distribution of study participants according to the intensity of reaction to the patch test

Reading of Patch test	Frequency in %
Negative	32
Faint reaction	21
1+	40
2+	7
3+	0
Irritant reaction	0

It was found that '1+' is the most common (42%) intensity of the reaction in the patch test followed by 'faint reaction' detected in around 22% of cases while 'negative reaction' was reported in 31% of the cases.

Discussion

The mean age of the patients in our study was 42.8 years. In a similar study conducted by Davoudi et al. in Iran, 43.6 years was the mean age of the patients. It was found that very young and very old persons are less affected, which could be because people acquire allergic reactions over a period of time and that response gradually diminishes with age. The present study revealed ACD is more common in males than females, which may be explained by the fact that in this part of the country males are more often recruited in industries and construction sites thereby getting more exposure to workplace and environmental allergens. The lesser presentation of females in the study group may be attributed to lower educational status, less awareness about ACD, and utilization of locally available traditional medicaments. The finding is similar to the study conducted by Narendra et al.4 with male to female ratio of 1.8:1 and the study conducted by Kishore et al.5 where the ratio was 1.27:1. The higher incidence of ACD in the LSES group in our study can be explained by the fact that manual work in various industries and construction sites involve the people from this group and their lower levels of education in preventing ACD, unavailability of proper protective gear in the workplace, poor personal hygiene, and negligence towards self-

care and treatment exposes them to the various allergens causing ACD. We found most of the patients were from urban areas (72%) than rural areas (28%). This is because of the presence of this tertiary care center in an urban area. The place of residence might have affected the pattern of illness, the treatment-seeking behavior, the type of lesion, etc. Statescu et al. showed the distribution of patients from urban areas is 57.38% and from rural is 42.62%.6

The higher incidence of ACD to cement in our study might be due to more people being employed in construction work in this part of India and the high percentage of construction workers visiting our OPD. In a study conducted in Mangalore, India, cement was also found to be the most common cause of ACD.7 With increasing industrialization in India, the construction industry is growing fast and requires a large number of workers leading to an increased incidence of ACD to cement. In our study, we found parthenium was the second most common allergen causing ACD. Airborne contact dermatitis was the most common pattern observed. This pattern was also the most common in the study conducted by Sharma et al.8

Cobalt sulfate is used as a component in paints for glass and porcelain, jewelry, zippers, buttons, tools, utensils, and instruments. In a study done by Liden et al.9 in 656 patients, ACD to cobalt was found in 14% of patients which is similar to our finding. Formaldehyde used in the production of urea, textile industry, cosmetics, etc. 5.79% came out to be patch test positive in our study group which can be correlated with the finding of Sharma et al.10 Neomycin is a broad-spectrum antibiotic available in topical creams, powders, ointments, and eye and ear drops. In our study, 2.89% were positive for neomycin. The first aid measures delivered by paramedics or the person himself may predispose him or her to neomycin-induced ACD. This finding is also supported by Menezes et al.11 Allergic contact dermatitis to fragrance mix is increasing nowadays. A cross-sectional study of five European countries demonstrated the prevalence of fragrance allergy was 1.9% to 2.6% among the general population.12 We too detected ACD to fragrance mix in some cases. Increased self-look awareness is a major cause of ACD by cosmetics among teenage girls in this region.

Conclusion

A patch test is an essential tool in diagnosing the etiological agent of ACD. The interpretation of the patch test requires experience and training in considering their relevance and associating the result with the clinical findings of ACD. Many cases of ACD in which etiology could not be found were patch tested and in some cases, allergens were found, which confirmed the diagnosis and were treated accordingly. Upon patch testing, 69% of the patients showed one or more positive patch test results. This depicts that the prevalence of patch test-positive ACD is 69% in this study, which could be because only a standard series was used and the patient may not be sensitized to it. Therefore, the use of a specific additional series (cosmetic, fragrance, industrial) is justified in these cases. When performed and interpreted properly patch test is the only scientific method of investigation and the only definite proof of the state of allergic sensitization.

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