IOSR Journal of Dental and Medical Sciences (IOSR-JDMS)
e-ISSN: 2279-0853, p-ISSN: 2279-0861.Volume 20, Issue 4 Ser.12 (April. 2021), PP 41-46
www.iosrjournals.org

Role of Patch Test in Allergic Contact Dermatitis

Dr.B.Jyothi[1] and Dr.Soumya Lakshmi.S[2]
Under the guidance of Dr. D.V.S.Pratap,Professor of Skin, S.T.D. & Leprosy
[1]Department of Dermatology, Venereology and Leprology, Prathima Institute of Medical Sciences, Nagunur, Karimnagar, Telangana
[2]Department of Dermatology, Venereology and Leprology, Prathima Institute of Medical Sciences, Nagunur, Karimnagar, Telangana

Abstract:
Background: *Patch Testing is a simple non invasive diagnostic procedure of Contact were subjected for patch test to detect Dermatitis. It is performed by applying the standard series of antigens along with suspected substances in appropriate concentrations to the normal skin in a standardised vehicle and the results are read after 48-72 hours as per the criteria laid down by International Contact Dermatitis Research Group. At present Patch Testing is the only practical and scientific method of demonstrating contact hypersensitivity. This Test elicits an immune response by challenging an already sensitized person to defined amounts of allergen and assessing the degree of response. The test relies on the allergen being absorbed in sufficient quantity to induce a reproducible inflammation of the skin at the site of application in sensitized person.*
Materials and Methods: *A total of 50 patients of either sex, in the age group of 10-69 years, with clinically suspected contact dermatitis who attended the Out Patient Clinic of Department of Dermatology Department of Prathima Medical College, Karimnagar were studied . Based on history, occupational exposure, hobbies and examination findings patch test was conducted on them to detect causative agent. The test is based on the principle that in allergic individual, the whole skin is capable of reacting with the causative agent. For the test, patients presenting with eczematous lesions of more than one month in whom clinical suspicion of Allergic Contact Dermatitis is present and willing to undergo Patch Testing with informed consent were selected.*
Results: *Patch test was found to be positive in 70.1% of the patients(I.e. 35 out of 50 cases studied).Occupation among these patients varied from housewives, mason,, farmers, factory workers, clerks, student and others. The predominant sites involved among those found to be positive to the test in the order of priority is hands, airborne, hands and feet, face, feet and other generalized parts*
Conclusion: *The highest incidence of eczema was seen in the age group of 2nd and 3rd decade of life. Lichenification was the commonest morphological pattern followed by dry scaling, erythema papulovesiculation, oozing and depigmentation. Potassium dichromate was found to be the commonest allergen in hand dermatitis. It was followed by rubber ingredients, parthenium, nickel sulphate and others.*
Key Word: *Contact Dermatitis; Allergen; Patch Testing; Luchenification; Parthenium; Nickel sulphate.*

Date of Submission: 14-04-2021 Date of Acceptance: 28-04-2021

I. Introduction

Man is exposed to a large variety of agents in the environment. It is interesting to note each of these agents is potential antigen, though some agents are more potent than others in causing allergic reaction. [1,2] Contact dermatitis is an inflammatory response of skin to an exogenous substance which may be irritant (or) allergen.[3,4] Contact dermatitis is divided into two major types, contact irritant dermatitis (CID) and contact allergic dermatitis (CAD) both of which include contact urticaria and photo contact dermatitis[5]. CAD is due to delayed cell mediated allergic reaction to allergens that directly contact the skin. Most allergens in contact dermatitis are of low molecular weight (<500 Daltons) and are traditionally called "haptens".[6]

Contact dermatitis is a common condition seen in upto 15% of patients attending the dermatology outpatient department. The prevalence of CD varies from 1.5% to 5.4% in the general population. It depends upon the prevailing allergens in that region and their exposure pattern. Contact sensitivity may vary over a period of time In the same population group. Predisposing factors include certain occupations, sensitivity to some metals, integrity of skin and chronic ulcers, prescribing patterns of physicians in the area and environmental agents like plants, fertilizers, pesticides, sprays and insecticides.

Langerhan cells are the principle antigen presenting cells in the epidermis. Together with keratinocytes, they play a major role in activation phase of CD, while CD 4 T lymphocytes play a crucial role in elicitation phase. The clinical manifestations of CD are due to various cytokines released. Depending upon nature, dose and duration of exposure to allergen.

CD is mainly classified into acute, sub acute and chronic stages. A complete history of the patient is essential in establishing the aetiology of CD. The clinical picture and its distribution helps to arrive the cause in many cases.

A simple and non-invasive diagnostic procedure cogmens the diagnosis of CD is a patch test. It is performed by applying the standard series of antigens along with suspected substances in appropriate concentrations to the normal skin in a standardized vehicle and the results are read after 48-72 hrs as per criteria laid down by International Contact Dermatitis Research Group (ICDRG).

The treatment of CD includes avoiding of allergen responsible for dermatitis. Identification of causative allergen is not only important but becomes mandatory. Hence proper evaluation of patient reduces both suffering ad economic impact in Contact Dermatitis. A lot of research work has been done in many developed countries with several important research publications. Still there is a major lacunae in understanding the subjects such as prevelance, clinical pattern and nature of allergen responsible of CD[7].

Majority of Indian population lives in rural areas and agriculture is the main occupation. Rapid industrialization has taken place in recent years manufacturing variant of commercial products.[8] Medley of traditions language, custom and variety flora are some of the factors responsible for variations in clinical pattern and etiological factors responsible for CD.[9] Hence present study was undertaken to focus more light on some of these aspects of CD.

II. Material And Methods

A total of 50 patients of either sex with clinically suspected contact dermatitis who attended the Out Patient Clinic of Dermatology Department of Prathima Medical College, Nagnoor, Karimnagar during 2015-2018 were examined. Based on history, occupational exposure, hobbies and examination findings were subjected for patch test to detect causative allergen. The test is based on the principle that in allergic individual the whole skin is capable of reacting with the causative agent. Therefore, if the antigen is applied on normal looking skin area, it would produce a definite dermatitis reaction.

Selection of Patients:

Inclusion criteria:

1. Patients presenting with eczematous lesions of more than one month in whom clinical suspicion of ACD is present.
2. Patients willing to undergo patch testing with informed consent for confirmation of their clinical diagnosis.

Exclusion criteria:

1. Other dermatological conditions resembling eczemas (psoriasis, tines etc.)
2. Patients receiving systemic corticosteroids equivalent to 20 mg prednisolone or above / immuno suppressive therapy for the preceding 14 days
3. Children and pregnant women.

III. Results

A total of 50 patients of either sex with chronic eczematous lesions clinically suggestive of allergic contact dermatitis were included in the study. The results are presented here under broad categories viz. epidemiological data, clinical data and patch test data.

EPIDEMIOLOGICAL DATA

Sex-wise distribution of cases: Males: 27 (54%) Females: 23 (46%)

Age-wise distribution of cases: The patients were in the age group of 11 – 69 years. Maximum number of cases 44% were seen in 20-29 years age group.

Distribution of cases according to their occupation:

Most of the patients included in the study were engaged in household workers followed by mason, farmers, factory workers, medical and paramedical persons and the rest students, clerks and miscellaneous .

Distribution of cases according to presenting complaints (n=50)

Complaints	No.of patients	%
Itching	38	76.00
Blistering	16	32.oo
Oozing	25	50.00
Cracking and fissuring	23	46.00
Pustules	4	8.00
Swelling and edema	1	2.00
Scaling and crusting	18	36.00
Hyper pigmentation	14	28.00

Thickening of skin	16	32.00
Ulceration	2	4.00
Depigmentation	1	2.00

Itching is the commonest symptom followed by oozing, cracking and fissuring, scaling and crusting, thickening of skin, hyper pigmentation, pustules, ulceration and swelling over extremeties. Photosensitivity over lesions was observed in few cases.

Duration of disease:
The duration of disease varied from ,1 month to more than 5 years. The most commonly observed period is 2.5 years

Distribution of cases according to site involved:

Site affected	Males		Females		Total	
	No	%	No	%	No	%
Hands	6	12,00	9	18.00	15	30.00
Feet	4	8.00	2	4.00	6	12.00
Hands & feet	6	12,00	4	8.00	10	20.00
Airborne	7	14.00	2	4.00	9	18.00
Generalised	0	0.00	1	2.00	1	2.00
Face	1	2.00	5	10.00	6	12.00
Others	3	6.00	0	0.00	3	6.00

The predominant site involved among these patients include in the order of priority hands, airborne, hands and feet, face, feet and others.

Distribution of cases according to morphology of lesions (n=50)

Morphology	Males		Females		Total	
	No.	%	No.	%	No.	%
Erythema	8	16	8	16	16	32
Papulo vesicles	6	12	8	16	14	28
Oozing	1	2	0	0	1	2
Dry Scaling	9	18	12	24	21	42
Cracking & fissuring	8	18	11	22	19	38
Ulceration	1	2	0	0	1	2
Lichenification	20	40	16	32	36	72
Hyper-pigmentation	6	12	8	16	14	28
Depigmentation	0	0	1	2	1	2

In the morphological pattern of lesions observed in the contract dermatitis, lichenification is the commonest followed in the order of descending priority of dry scaling, erythema, cracking and fissuring, hyper-pigmentation, papulo vesicles, oozing, ulceration and depigmentation etc.
Airborne distribution means involvement of face, neck, both hands and feet, front of chest viz. exposed areas irrespective of flexural involvemet
All patients have involvement of both hands except 1 only left hand.
Among patients with face involvement, 3 had bindi dermatitis.
Of the 11 patients engaged in household works (8/11) suffered from dermatitis of hands or feet (3/11) had facial involvement. Among the paramedical personnel (3/3) had involvemn of hands. In masor and factory workers (5/12) had involvement of hand dermatitis while (4/12) had feet dermatitis and (3/12) had involvement of hand and feet. In farmers dermatitis over both hands was xseen (1/10) and both hands and feet was seen among (1/10) and (7/10) had involvement of all exposed parts.

Corelation of positive patch test results with work related antigen:

Occupation	Patch Test	No	%
Housewives	11	5	45.45
Medical and Nursing	2	1	50.00
Laboratory work	1	0	0
Farmer	10	8	80.00
Students	4	0	0
Factory workers	3	2	66.66
Mason	9	5	55.55
Clerical	3	0	0
Miscellaneous	7	2	28.57

Total	50	23	46

A positive response to work related antigen was found in housewives, farmers, factory workers, medica nursing and laboratory workers. History and examination revealed a suspected allergant in 47 out of 50 patients. Patch test correlation was high to suspected allergen in farmers (7/47) mason (5/9) housewives (5/9) medical and paramedical profession etc.

Out of 50 cases in the study group 35 showed positive patch test results. For one allergen in 343%, two allergens in 14%, three allergens in 8%, four and more allergens in 4%.

Among 35 patients with positive patch test 10/35 had hand involvement, 4/35 hand dermatitis of feet, 6/35 of hands and feet, 7/35 had involvement of exposed parts, 5/35 had facial involvement and one patient had generalised distribution of disease.

The details about etiological profile of allergens found positive to patch test are shown in the table below:

Patch Test result (Indian standard series) (N=35)

S.No.	Allergen	Males	Females	Total No. of cases & percentage
1	Vaseline			
2	Wool alcohol			
3	Perublasm		1	1 (2.85)
4	Formaldehyde	1		1(2.85)
5	Mercaptobenzothiazole			
6	Potassium dichromate	6	2	8 (22.85)
7	Nickel sulphate		4	4 (11.42)
8	Cobalt sulphate		1	1 (2.85)
9	Colophony			
10	Epoxy resin			
11	Paraben mix	2	1	3 (8.57)
12	Paraphenylene diamine	1		1(2.85)
13	Parthenium	5	2	7(20.1)
14	Neomycin sulphate			
15	Benzocaine			
16	Chorocresol	1	1	2(5.71)
17	Fragrance mix			
18	Thiuram mix	2		2(5.71)
19	Nitrofurazone			
20	Blackrubber mix	2		2(5.71)
21	Onion			
22	Potato			
23	Garlic		2	2(5.71)
24	Tomato			
25	Hardner			
26	Detergent		1	1(2.85)
27	Godrej hair dye			
28	Grease			

IV. Discussion

Contact Dermatitis is a common disorder accounting for 10-15% of all patients attending dermatology OPD. It causes considerable morbidity mainly due to recurrence of lesions sudden flare ups, financial and work time losses, inappropriate job change, discomfort and disability due to continued exposure to the offending allergen. The single most important factor in the management of this condition is the avoidance of the causative allergen. Patients present with varied clinical features and the diagnosis including causative agent is usually established after careful examination of the patient and performing the patch test.

It is well established in earlier studies that contact dermatitis can occur in all age groups. It is pertinent to note that the young adults with the mean age varying from 25 to 41 years are predominantly affected. This feature is substantiated in the present study table given belo**w.**

Age And Sex Distribution in Different Studies:

Preponderance of the disease in young adults is a mere reflection of the more active life styles of these individuals with vulnerability for exposure to multiple allergens in their environment. A decreased incidence of contact dermatitis is reported in the paediatric and geriatric age groups by several authors including the present study. Behaviour patterns and environmental exposure variations among these age groups is believed to be responsible for this parity. Further it has been observed that the inflammatory responses are diminished in the individuals of geriatric age groups

Contact dermatitis is seen in both males and females. However minor differences have been noted in the sex distribution in various studies that has been attributed to the environmental variation between two sexes. However in present study in both sexes are represented with slight male preponderance and similar observations were noted by Al-Sheikh et al.

Contact dermatitis constitutes one of the important problems seen in the work environment. Several people working in professions such as agriculture, industry, mason are prone to develop Contact dermatitis depending upon their occupation. Housewives constituted a large proportion in the present study followed by mason, clerks, medical and others. They found high prevalence of metal sensitivity while studying CD in prefabricated construction factory workers. Zhang et al has found large number of he [ersistnce of their patients being factory workers.

Duration of the contact dermatitis varies depending upon the nature of the allergen, mode of exposure and lack of awareness as noted in several studies. Sharma et al reported average duration of 3.5 years with a range of 2 months to 10 years. While Bajaj reported cases with duration of their complaints ranging from 10 days to 7 years. Contrast, the data in the present study revealed that the duration of disease from <1 month to more than 5 years with an average of 3.51 years. The chronicity may be due to persistence of the antigen in the environment.

The clinical features may vary from mild local dermatitis to widespread erythroderma depending upon the nature of antigen, duration and extent of exposure and the underlying skin conditi0n. At times the picture may be quite confusing with bizarre symptoms. Itching was the commonest presenting complaint in the present series and the morphological pattern of lesions varied from scaling, erythema, cracking and fissuring and others. Recurrences were frequently encountered .

Hand dermatitis was the predominant clinical pattern noted in the present study which is in conformity with other reports of Al Sheikh et al. However airborne contact dermatitis is the most frequently noted pattern in the series reported by Sharma and Chakrabarty and they attributed it to th abundance of parthenium in and around the city.

Hand dermatitis is very common in housewives because of their frequent exposure to physical and chemical injury and excess contact with water in their environment. This is further substantiated in the present study. Mason had involvement of the hands in the present series and this could be attributed to the contact of cement exposed parts of skin causing damage. However it is intriguing note that none of them reported.

Medical and paramedical personnel are exposed to a variety of chemicals and reagents during the pursuit of their occupation predisposing them to sensitization by these agents resulting in hand dermatitis. This feature is the commonest clinical pattern seen in the present series. .

Airborne contact dermatitis (ABCD) is an important and rapidly expanding clinical pattern of contact dermatitis noted in certain professions such as agriculture. This feature has been noted in 60% farmers and 17% in the overall study group in the present series. Sharma et al found 59% of their patients having ABCD and they attributed this to the exposure to various plants and weeds during their occupation.

Parthenium was found to be the commonest allergen in present series. Sharma and Chakrabarti have similarly found it to be the commonest sensitizer in their patients and they attributed it to the abundance of this plant in and around the city. This weed was inadvertently introduced in India along with imported wheat in 1966.Later it was revealed that this plant has been responsible for contact dermatitis in various parts of our country. The potent allergen parthenium is present in all parts of this plant and responsible for the sensitization. It grows by the side of roads and other places throughout the year but more profusely during rainy season. Mahan et al also reported similar observations. Sensitivity to Sesquiterpene Lactone Mix (SQL mix) varied from 1.5% to 3.5% in western countries and this is very much lower in comparison to the reports published from India. Geographical ethnic variations and is recent introduction in our country could account for this difference in the incidence observed.

The etiology of Contact dermatitis is quite varied. A wide variety of substances including chemicals, proteins, pollen, metals, woolen etc. may be responsible for this entity.

Chromates are distributed widely and more abundantly in the environment than any other metal. People are exposed to this metal by items of daily use like leather, paints, bleaching agens, cement, gloves, shaving creams and lotions.

Nickel is the obiquitously present metal and has been held responsible for high rates of sensitization in females in various studies and this has been attributed to the universal practice of ear piercing and contact with artificial jewellery . Al Sheikh et al has seen 22.2% of their patients reacting to nickel and attributed it to the higher use of artificial jewellery in Saudi Arabia.

Cobalt is another frequent sensitizer. Its sensitivity may relate to dental plates, prosthesis, plastics, vitamin B12, printing inks, polyester, lubricating oils, cement and detergents. Cross sensitivity between Cobalt and chromium is also seen commonly. It was shown to be a common cause of sensitization in the series by

Nethercott et al and Al-Sheikh et al. This low incidence of sensitivity could be attributed to the geographic, ethnic variations and the type of occupation the person is having.

Rubber articles and rubber slippers are frequently used in Indian families and this is responsible for sensitization in many patients.

Medicaments are responsible for very few cases of sensitization in present study. Nitrofurazone was responsible for 2.665 of the cases and none had sensitization to gentamycin and neomycin. These allergen in contrast were found to be the frequent sensitizer in the series reported by Shenoi et al in Manipal. Medicament sensitization is known to increase with age as the person becomes exposed to more and more medications because of the chronicity of his disease and also depends upon pattern of prescription by the Physicians. Perhaps some of these factors may be responsible for the low incidence of topical medicaments sensitivity noted in the current series wherein the majority of the patients are in younger age groups.

Among the cosmetics, fragrance mix and godrej hair dye were found to be responsible in few cases.
Patch Test is the mainstay in establishing the diagnosis and physiological role of the suspected allergen in CD. The percentage of positive patch test reaction with one or the other allergen in CD patients has been reported to vary from 47% to 65.5% by several authors from India and abroad including the present study.

Patch test was found to be positive in 70.1% of the patients studied in the present series. Positive reaction was noted with the clinically suspected allergen in three quarter of these patients.

Minor variations in the Patch test positivity with different allergens was observed in males and females by several authors including present series. Al Sheikh et al has found allergic contact dermatitis more frequent in women as compared to men and they proposed that it could be due to a high rate of sensitization to certain allergens such as nickel, cobalt and fragrances. The incidence of positive reactions with patch test in relation to different clinical patterns (site of involvement) of CD has been reported in several studies.

In present study out of 35 patients who were positive to patch test 10 had hand dermatitis, 4 had feet dermatitis, 6 had hands and feet, 7 had exposed parts an d 5 had facial dermatitis. The presence of maximum number of patch test positive patients with hand dermatitis signifies the importance of careful evaluation of every case of hand dermatitis, airborne pattern was seen in patients while back of neck was involved. Airborne dermatitis was seen to be the commonest pattern with patch tst positivity by Sharma and Chakrabarti in their study, while Al Sheik et al found hand dermatitis in 25.7% of their patch test positive patients. The presence of maximum number of patch test positive patients with hand dermatitis signifies the importance of careful evaluation of every case of hand dermatitis.

Garlic is used in almost every vegetarian or non-vegetarian South Indian family and observed to be the common vegetable causing sensitization in housewives with dermatitis. Similar reports have been published by Baja and Sinha et al. They have attributed this to the perennial use and potent sensitizing capability of garlic when used for longer period.

V. Conclusion

- Based on the clinic etiological evaluation of 50 clinically suspected contact dermatitis patients are tested with patch testing.
- The highest incidence of eczema was seen in the age group of 2nd and 3rd decade of life which is the most active part of life.
- Patch test helps in revealing etiology in 70.1% of patients
- Potassium dichromate is the common sensitizer followed by Parthenium.s

References

[1]. Edman B. Sitres of contact dermatitis in relationship to particular allergens. Contact Dermatitis 1985;13:120-135.
[2]. Wilkinson DS. The role of contact allergy in hand eczema. Trane St.John's Hosp Dermatol Soc. 1970;56:19-21
[3]. Agrup G.Hand eczema and other hand dermatoses in South Sweden. Acta Derm Venereol (Stockh) 1969;49:61-67
[4]. Pasricha JS Contact dermatitis in India. 2nd ed.New Delhi The Off setters;1988.151-154.
[5]. Bajaj AK Saraswat A. Contact dermatitis. 3rd ed. In IDVL Text Book of dermatology. Valia AR.eds. Bhalani Publishing House;2008;545-590
[6]. Reddy BSN, Ramesh V.Occupational Contact Dermatitis in India Asian Pacific News Letter 1998;5:4-5.
[7]. Singhal V.Reddy BSN Common Contact Sensitizers in New Delhi J Dermatol 2000; 27 :440-445
[8]. Mehta S.Reddy BSN. Pattern of Cosmetic sensitivity in Indian patients. Contact Dermatitis. 2001; 45:292-293.
[9]. Mansi S Reddy BSN. Pattern of costemic sensitivity in Indian patients with hand eczema J Dermatol 2003; 30.9:649-654.
[10]. Landsteiner K, Jacobs J. Studies on the sensitization of animals with simple compounds. J.Exp. Med 1936;64:629-639.
[11]. Sharma VK Chkrabarti A Common contact sensitizer in Chandigarh India, Contact dermatitis 1998; 38:127-131.
[12]. Huda MM, Paul UK. Patch testing in contact dermatitis of hands and feegt, Ind J Dermatol Venereol Leprol 1996;21:519
[13]. Kies Swierczynska M. Occupational dermatoses and allergy to metals in polish construction workers manufacturing prefabricated building units. Contact Dermatitis 1990;23:27-32.
[14]. Fregrets, Hjroth N, Mangnuson B et al Epidemiology of contact dermatitis. Trans St. John's Hosp Derma soc 1969;55:17-35.
[15]. Fischer T. Malbatch HT. Patch testing in allergic contact dermatitis. An updataIn: Occupational and industrial dermatology Chicago: Year Book Medical 1987; 190-210.