

Prevalence of polysensitivity in allergic contact dermatitis: A five-year retrospective study

Dear Editor,

Contact allergy is an exaggerated reaction of the individual's immune system following exposure to low molecular weight chemicals triggering cell-mediated immunity.¹

The term polysensitisation (syn.: polyvalent sensitisation, multiple contact allergies) describes sensitisation to more than one allergen verified by appropriate tests (e.g. skin prick test, specific immunoglobulin E [IgE] assays and epicutaneous patch testing).¹

In India, there is a paucity of studies focused on polysensitivity. The main purpose of this study was to identify the common allergens involved, observe the patterns of monosensitisation and polysensitisation in allergic contact dermatitis (ACD) cases using the Indian standard series (ISS) and provide a review on polysensitivity.

A retrospective analytical study was done from 2015 to 2020 in the department of dermatology, JSS medical college, JSSAHER, Mysore. Clinically suspicious cases of ACD at any site irrespective of age and sex were subjected to patch testing using Indian Standard Series (ISS) with 20 allergens approved by Contact and Occupational Dermatitis Forum of India (CODFI). We used International Contact Dermatitis Research Group (ICDRG) criteria to identify the positive allergens in our study: 1+ erythema, infiltration and papules; 2+ vesicles; and 3+ vesicles coalescing to form bullae. Readings were taken on days two, four and seven. The comparison was done based on age, sex, site of eczema and allergens involved in monosensitivity and polysensitivity.

History, clinical presentation and outcome of patch test results and type of allergen were considered for relevancy. Among 182 patients, patch tests of 164 (89.61%) patients were relevant.

A total of 348 cases of ACD were included. Patch testing was positive in 182 patients (52.6%), single positivity in 114 (62.6%) and polysensitivity in 68 patients (37.1%).

Positivity was seen more commonly in adults (19-64 years) [n=163 (89.6%)], followed by geriatric (>65 years) patients [n=11 (6%)] and adolescents (10-18 years) [n=8 (4.4%)]. Positivity to patch tests were slightly more in females [n=92 (50.5%)] compared to males [n=90 (49.5%)]. The most common sites involved in polysensitivity were both hands and feet [n=72 (39.6%)], followed by exclusive foot involvement [n=45(24.7%)] and generalised eczema [n=30 (16.5%)] [Table 1]. Polysensitivity to two, three and four allergens were seen in 45 (66.1%), 17 (25%) and 4 (5.8%) patients, respectively. There was one (1.5%) patient who had polysensitivity to five allergens and one (1.5%) to seven allergens [Figure 1].

We noted that polysensitivity was commonly seen with potassium dichromate and cobalt chloride among nine patients in hand-feet eczema; potassium dichromate, cobalt chloride and nickel sulphate among two patients in hand eczema; mercapto mix and 2-mercaptobenzothiazole (MBT) in five patients with feet eczema. We did not find polysensitivity among leg eczema cases and no allergens showed any common trend in generalised eczema.

There is ambiguity in the definition of polysensitisation. Few authors consider it to be a positive reaction to two or more allergens and few consider three or more allergens.¹ Positive patch test results to two or more allergens were considered as polysensitivity in this study. Monosensitivity was seen more commonly with females [n=65 (70.7%)], whereas

Table 1: Frequency of monosensitivity and polysensitivity among the different sites involved in eczema

Site of eczema	Monosensitivity	Polysensitivity
Hand-feet eczema	39(54.2%)	33(45.8%)
Hand eczema	15(68.2%)	7(31.8%)
Feet eczema	29(64.4%)	16(35.6%)
Leg eczema	1 (100%)	0
Generalised eczema	30(71.4%)	12(28.6%)

How to cite this article: Aradita C, Sahana S, Ranugha P.S.S, Kanthraj GR. Prevalence of polysensitivity in allergic contact dermatitis: A five-year retrospective study. Indian J Dermatol Venereol Leprol. doi: 10.25259/IJDVL_880_2024

Received: June, 2024 **Accepted:** September, 2024 **Epub Ahead of Print:** December, 2024

DOI: 10.25259/IJDVL_880_2024

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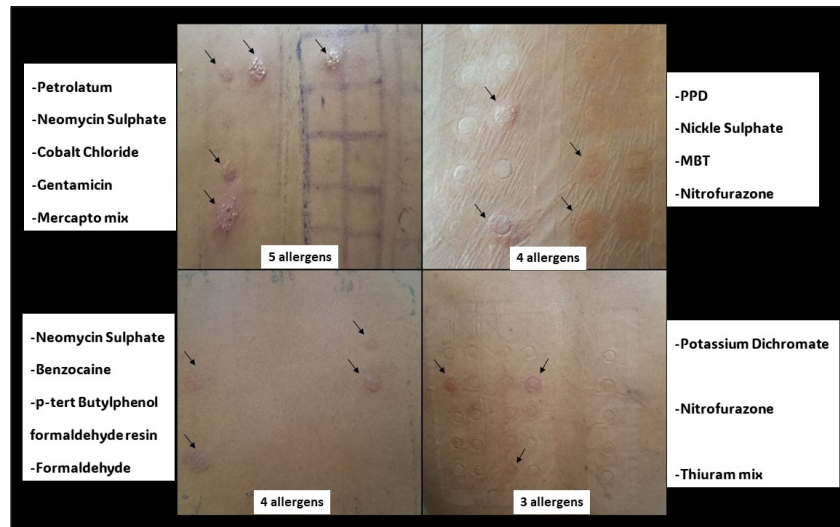


Figure 1: Polysensitivity in patch test readings to three, four and five allergens. (Black arrow-positive patch test).

polysensitivity was seen more in males [n=41 (45.6%)]. Among different occupations, farmers [n=28(63.6%)] showed the most polysensitivity and housewives [n=35 (79.5%)] showed the highest rates of monosensitivity. There was no statistically significant difference with regard to age, duration of eczema and site of eczema among patients with monosensitivity and polysensitivity. The three principal allergens in monosensitivity are nickel sulphate, potassium dichromate and paraphenyldiamine. Potassium dichromate, cobalt chloride; potassium dichromate, nickel sulphate; potassium dichromate, cobalt chloride, nickel sulphate; mercapto mix, 2-mercaptobenzothiozole are the three common allergen combinations involved in polysensitivity [Table 2]. Among the sites involved, patch tests in hand-feet eczema 35(48.6%) showed maximum polysensitivity.

Table 2: Summary of frequency of the most common allergens involved in monosensitivity and polysensitivity

Allergens	Polysensitivity	Monosensitivity
Potassium dichromate, cobalt chloride	10 (14.7%)	
Potassium dichromate, nickel sulphate	10 (14.7%)	
Potassium dichromate, cobalt chloride, nickel sulphate	5 (7.4%)	
Mercapto mix, 2-mercaptobenzothiozole	5 (7.4%)	
Nickel sulphate		42 (36.8%)
Potassium dichromate		32 (28.1%)
Paraphenyldiamine		22 (19.3%)
Others	38	18

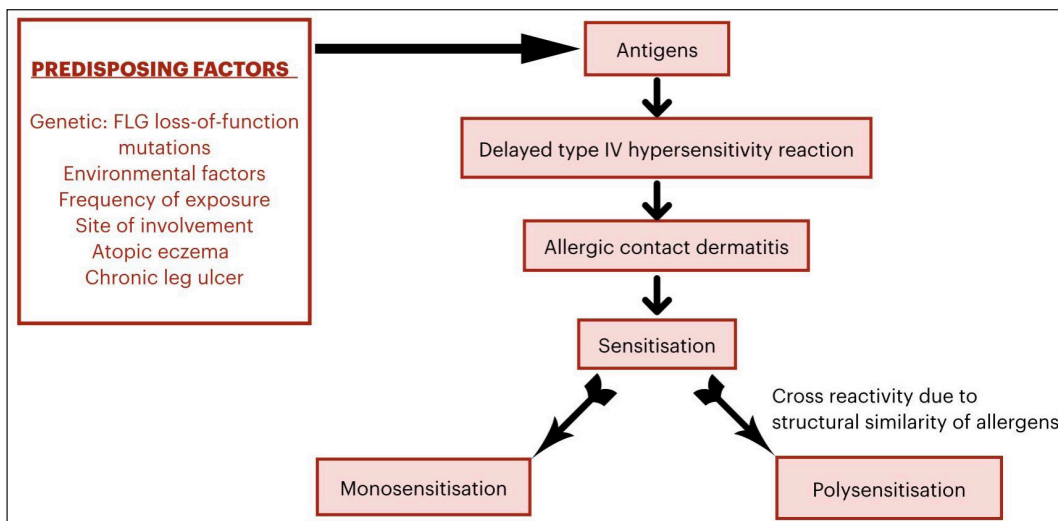


Figure 2: Flow chart of pathogenesis of polysensitivity/multiple contact allergies/concomitant reactions. (FLG –filaggrin).

Mahajan *et al.*² observed that polysensitivity occurs due to concurrent exposure to allergens eliciting multiple positive patch test reactions from exposures to multiple allergens, non-specific hyper-reactivity or as cross- reactions between tested allergens. It is observed commonly for metals (nickel sulphate, cobalt chloride and potassium dichromate), rubber chemicals (mercapto mix, thiuram mix and monobenzothiazole (MBT), paraphenylenediamine (PPD) and parabens, compositae plants and some fragrances and Balsam of Peru. We observed a similar pattern.

Distinguishing between true polysensitivity or angry back³ or excited skin syndrome or false positive reaction is necessary. Repeat patch testing can be performed. The reactions decrease by 40–60% in polysensitivity and 80% in angry back syndrome.⁴ The predisposing factors⁵⁻⁶ and pathogenesis of multiple contact allergies are depicted in Figure 2.

A detailed assessment and personalised approach is required to manage the individual's allergic triggers, aiming to reduce exposure to these allergens in the future and avoid cross reactions.

To conclude, 90% of the patch tests were clinically relevant. Polysensitivity was seen mostly in men among farmers, whereas monosensitivity was seen in women among homemakers. Nickel sulphate and potassium dichromate were common denominators in both polysensitivity and monosensitivity. On the contrary, paraphenyldiamine was more frequently observed with monosensitivity and cobalt chloride with polysensitivity.

Acknowledgement: We are thankful to Dr. Lancy D'souza PhD, Professor in Psychology, Maharaja's College, University of Mysore, Mysore, Karnataka, India for research consultancy and statistical analysis of the data.

Ethical approval: The Institutional Review Board approval was not sought due to retrospective analysis of the data.

Declaration of patient consent: The authors certify that they have obtained all appropriate patient consent.

Financial support and sponsorship: Nil.

Conflicts of interest: There are no conflicts of interest.

Use of artificial intelligence (AI)-assisted technology for manuscript preparation: The authors confirm that there was no use of AI-assisted technology for assisting in the writing or editing of the manuscript and no images were manipulated using AI.

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