

Allergen Activity Pattern in Patch Test on Allergic Contact Dermatitis Patient at Dermato-Venereology Clinic, Dr. Sardjito Central General Hospital, Yogyakarta 2012-2016

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Abstract: Allergic Contact Dermatitis (ACD) was caused by some group of substances which was called allergen. Groups of those substances have their own characteristic as a sensitizer or irritant. Clinical manifestation as a visible symptom is a balancing result between sensitizer and irritant that will be describe on pattern of allergen activity from patch test result. This research was performed to describe allergen activity pattern for five of most common founded allergen in patch test for ACD patient performed at Dermato-Venereology Clinic, dr. Sardjito Central General Hospital, Yogyakarta from 2012-2016. The most common allergen was Nickel Sulphate, Potassium dichromate, Cobalt chloride, Fragrance mix I and Fragrance mix II. Literally found that primarily all of them are irritant, and secondary are sensitizer. Activity pattern dominantly as sensitizer were showed by Nickel Sulphate, Potassium dichromate, Cobalt chloride for interpretation at 48-72 and 48-96 hours, where for Fragrance mix I and Fragrance mix II dominantly as a sensitizer was described for interpretation at 48-72 hours and dominantly as irritant for 48-96 hours. Interpretation at 48-72-96 hours continuously showed no specific allergen pattern.

1 INTRODUCTION

Contact allergies are complex diseases, and one of the important challenges for public health and immunology. It was still a challenge for medical sciences to perform optimum management for the patient. Contact dermatitis was divided to Allergic Contact Dermatitis (ACD) and Irritant Contact Dermatitis (ICD). 15–20% of the general population was estimated suffered from contact allergy. Workplace exposure, age, sex, use of consumer products and genetic predispositions were identified as the most important risk factors. (Peiser,2012). The basic pathophysiology for this disease is hypersensitivity mechanism especially type IV/ slow onset type for the person who has experiencing sensitization and elicitation previously and finally show clinical manifestation, while ICD could be suffered by any individual. (Diepgen, 1999) ACD was founded mostly on developing country where the incidence rate is believed to be around 0.5 ± 1.9 cases per 1000 full-time workers per year.(English, 2004).

Each allergen has their own characteristic and differ from each other and it was one of the factor which caused variation on clinical manifestation for the person who has been contacted to those allergen. The characteristic / activity for chemical substance were sensitizer and irritant, and each of them showed different activity pattern where it was ascending for sensitizer and descending for irritant on the patch test interpretation result. Although contact dermatitis uncommonly leads to hospitalization, and minor degrees of contact dermatitis are often accepted as a normal hazard of life, the occupational, domestic, social and psychological implications may be considerable. It must be assumed that the total economic impact of ACD is very high. The research was performed to describe allergen activity pattern visible on interpretation of patch test result on ACD patient at Dermato-Venereology clinic, dr. Sardjito central general hospital, Yogyakarta from 2012-2016.

2 METHODS

This is a descriptive retrospective research using medical record data from patients that have been diagnosed as an ACD and have been performed patch test in Dermato-Venereology clinic dr. Sardjito central general hospital Yogyakarta from 2012-2016 using standard serial patch test and listed for five of the most common founded allergen. The listed allergen was analyzed for its activity pattern showed on patch test interpretation from 48, 72, 96 hours. Each allergen was compared for its activity from 48 to 72 hours, 48 to 96 hours, and 48-72-96 hours then calculated for percentage.

3 RESULTS

Five of most common founded positive allergen listed were Nickel sulphate, Potassium dichromate, Cobalt chloride, Fragrance mix I, and Fragrance mix II. Interpretation on patch test result for Nickel sulphate, Potassium dichromate, Cobalt chloride at 48-72 hours and 48-96 hours showed dominantly sensitizer pattern (ascended). Interpretation for Fragrance mix I, and Fragrance mix II showed sensitizer pattern on interpretation at 48-72 hours, while for interpretation at 48-96 hours showed dominantly irritant pattern. No specific dominant pattern was showed on interpretation at 48-72-96 hours, as minimal limitation score as sensitizer and irritant showed on table 2.

4 DISCUSSION

The prevalence of contact allergy is rising worldwide. This results in high costs for health care systems and the economy as well as in an impairment of the quality of life for the patients. (Nguyen, 2008), (Kohl, 2002), (Lunder, 2000). Contact dermatitis is often localized on the hands, a highly visible area of the body, thus drawing attention and causing difficulties in social interaction. Jowett and Ryan found that, in general, 38% of patients with eczema noticed interference with social life (Jowett, 1985). In a follow-up study of 954 patients with contact dermatitis, 61% reported that they had lost time from work due to their skin disease (Mälkönen, 2009). About 6% of all patients had been off work for longer than 12 months continuously.

Each allergen or chemical substance has been studied and analyzed then listed on some literature, but visible clinical manifestation caused by those allergen or chemical substance could be varied, and not always as a result of its main characteristic. (Thyssen, 2007) In Europe about 20% of the general population suffers from contact allergy to at least one contact allergen. Most common are allergies to nickel, fragrances and preservatives. Allergic reactions to chromate and p-phenylenediamine (PPD) are generally less common but occur frequently in occupationally exposed subgroups of the population. Contact dermatitis occurs twice as frequently in women as in men and often starts at a young age, with a prevalence of 15% in 12–16 year olds. (Nosbaum, 2009). Literally said that all of those allergen most common founded positive on patch test for ACD patient at Dermato-venereology clinic central general hospital Yogyakarta 2012-2016 which are Nickel sulphate, Potassium dichromate, Cobalt chloride, Fragrance mix I and Fragrance mix II were mainly irritant and sensitizer secondarily (ASTM, 2005), (Sciencelab, 2013), (Sheet, 2009). Dominant activity pattern as sensitizer showed on interpretation on patch test result for Nickel sulphate, Potassium dichromate, Cobalt chloride at 48-72 and 48-96 hours. Dominant activity pattern as sensitizer showed on interpretation on patch test result for Fragrance mix I and Fragrance mix II at 48-72 hours while dominant activity pattern as irritant showed on interpretation at 48-96 hours. Interpretation at 48-72-96 hours continuously showed no specific allergen pattern. Contact dermatitis is a pattern of inflammatory response of the skin that may occur as a result of contact with external factors (allergens, irritants). The clinical picture is a polymorphic pattern of inflammation of the skin characterized by a wide range of clinical features like itching, redness, scaling, erythema, vesiculation, and clustered papulovesicles. In chronic cases, assuring, hyperkeratosis, and lichenification occur. The variety of morphologies and natural histories makes it difficult to define a widely accepted, standardized definition of the disease, which is needed to compare epidemiological studies. (Diepgen, 1999)

The difference on clinical manifestation could be caused by combination of endogenous factor (atopic) and exogenous factor (allergen concentration), and the balance of sensitize and irritant activity. Skin contact with irritants and/or allergens is a necessary condition of contact

Table 1 Allergen activity pattern for interpretation on 2 timing comparison

No	Allergen	Case number	48 and 72 hours pattern		48 and 96 hours pattern	
			Ascending (case/percent)	Descending (case/percent)	Ascending (case/percent)	Descending (case/percent)
1	Nickel sulphate	137	81 / 59,12	15 / 10,9	91 / 66,42	12 / 8,75
2	Potassium dichromate	123	69 / 56,09	12 / 9,25	83 / 67,47	13 / 10,56
3	Cobalt chloride	98	48 / 48,9	10 / 10,2	32 / 32,65	21 / 21,42
4	Fragrance Mix I	88	42 / 47,72	15 / 17,05	13 / 14,77	41 / 46,59
5	Fragrance Mix II	87	43 / 49,42	3 / 3,44	14 / 16,09	39 / 44,82

Table 2 Allergen activity pattern for interpretation on 3 timing comparison (48-72-96)

No	Allergen	Ascending (case/percent)	Descending (case/percent)	Non Pattern (case/percent)
1	Nickel sulphate	41 (29,92)	9 (6,56)	87 (63,50)
2	Potassium dichromate	37 (30,08)	4 (3,25)	82 (66,67)
3	Cobalt chloride	11 (11,22)	8 (8,16)	79 (80,61)
4	Fragrance Mix I	13(14,77)	9 (10,22)	66 (76,13)
5	Fragrance Mix II	21 (24,13)	2 (2,29)	64 (73,56)

dermatitis and the probability and severity of a reaction depend on the type and intensity of exposure. Additionally, apart from exposure to hazardous substances, there are many endogenous factors that may influence the development of contact dermatitis other than atopic condition such as the condition of the epidermal barrier, sensitization, psychological factors, age, and gender. Environmental factors may play a role in this process by influencing the individual susceptibility and the characteristics of exposure. A wide spread application of a weak allergen or irritant is more likely to result in a high proportion of cases than the use of a particularly strong but rare agent. It should be noted that exposure is characterized by concentration and duration. (Diepgen,1999), (COENRAADS,1983) It should be noticed that basically pathogenesis of ICD and ACD start simultaneously. (Diepgen,1999)

Strategies for prevention of ACD include identifying allergens and irritants, substituting chemicals that are less irritating or allergenic, establishing engineering controls to reduce exposure, and organizing the work in a way that all employees are exposed to the same degree. Personal protection, such as gloves or barrier cream, has to be the last choice, but is often resorted to in the first place. (Rea,

1967) Allergen activity pattern aid to describe the characteristic of each allergen and to create the prevention system and management. Further research needed with attention on availability of atopic factor and exact allergen concentration needed to caused skin reaction on patch test to normal population especially.

5 CONCLUSIONS

Data has showed that five of the most common founded positive allergen on ACD patient that has performed patch test in Dermato-venereology clinic dr. sardjito central general hospital Yogyakarta from 2012-2016 were Nickel sulphate, Potassium dichromate, Cobalt chloride, Fragrance mix I and Fragrance mix II. Activity pattern dominantly as a sensitizer was showed for Nickel sulphate, Potassium dichromate, Cobalt chloride at 48-72 hours and 48-96 hours' interpretation. Activity pattern dominantly as sensitizer for Fragrance mix I and Fragrance mix II was showed at 48-72 hours' interpretation while for 48-96 hours show dominantly irritant pattern. Interpretation for 48-72-96 hours continuously

showed no specific dominant activity pattern. Further research needed for assessment the atopic risk factor's influence and exact allergen concentration needed for skin reaction on patch test for normal population

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