

Editorial

Nickel dermatitis

Muhammad Saleem Khan, Atif Hasnain Kazmi

Department of Dermatology, Unit-I Mayo Hospital, Lahore

Many chemical agents can cause allergic contact dermatitis (ACD) but nickel is one of the most common allergens leading to allergic contact dermatitis.¹ Elemental nickel and sweat-soluble nickel salts both cause ACD by sweat solubilization (corrosion) of nickel and the formation of nickel ions, during intimate and prolonged contact with the skin. The rate of nickel ion release to the skin is dependent primarily on the specific substance having contact with the skin. Once nickel allergy has occurred, it persists for many years, often life-long. All age groups are affected but the incidence of nickel sensitivity amongst women tends to rise from 10 years onward.² The incidence of nickel dermatitis in Denmark varied with the total imports of nickel during and after World War II which suggests that the incidence of sensitivity is determined by the total nickel exposure in the environment. In Finland, 4.5% of general population was found to be nickel sensitive, 8% in women and 0.8% in men.³ The incidence of nickel hypersensitivity is rising. In Finland, among 500 school girls aged 7 to 17 years, the incidence of nickel hypersensitivity was 20 % in those with pierced ears and 2% in the subjects without.⁴ In an unselected Danish population study, sensitization to nickel was found in 14.8% of those with pierced ears as compared to 1.8% among those without pierced ears.⁵ The incidence of nickel allergy in women has been doubling every 10 years and is now

around 30%.⁶ In women, the most common cause of nickel dermatitis is direct contact primarily from jewellery, garments, spectacles, wrist watches, and the household environment. Hypersensitivity to nickel is relatively uncommon in males and does not seem to be increasing as in females.⁴ In men, nickel dermatitis is predominantly an occupational disease.⁷ Occupational nickel exposure occurs during nickel plating and electroforming of nickel. Other industries which use nickel compounds are battery production, some branches of enamel and glass production and chemical plants where nickel catalysts are used. Moderate exposures occur in mechanical engineering and in many industrial plants where nickel alloy is worked up or where metals are nickel plated.⁸

Calnan classified nickel dermatitis into two groups. *Primary*: areas in direct contact with metal present with an eruption, usually eczematous; and *secondary*: selective symmetrical areas are involved when the dermatitis spreads. The secondary eruption behaves like a sensitive hematogenous spread similar to an 'id' phenomenon. It is usually symmetrical and is related to the activity at the primary site. The secondary site may be the elbow flexures, sides of neck or face. The secondary eruption may manifest occasionally as an erythema multiforme, urticaria, prurigo or pompholyx.

Nickel dermatitis represents a type IV immunologic reaction. Spongiosis is the histologic hallmark of allergic contact

Address for correspondence

Dr. Muhammad Saleem Khan,
Department of Dermatology, Unit I,
King Edward Medical University, Lahore
E mail: saleemderma@yahoo.com

dermatitis.⁹ In nickel dermatitis, the histopathological changes in the skin are usually confined to the epidermis and dermis. The reaction depends on the intensity and duration of eczema (acute, subacute and chronic).

Proper history, clinical examination and result of patch test with European Standard Series can guide a physician to a correct diagnosis. Patch test is a procedure by which patients are exposed to suspected allergens under controlled conditions to verify the diagnosis of allergic contact dermatitis. The patches are applied on the back and removed after 48 hours. Results are recorded at 48, 72, 120 hours & on the 7th day interpreted according to the criteria set by International Contact Dermatitis Research Group (ICDRG).

The treatment of allergic contact dermatitis remains a major challenge. Current management strategies consist of elimination of the allergens when possible and therapy for symptoms with topical or systemic corticosteroids.¹⁰

Specific treatment is avoidance of the culprit allergen, such as jewellery (earrings, chains bracelets, necklaces, hairpins, clips, medallions), wearing apparel (zippers, buttons, buckles, metallic eyelets of shoes, eyeglass frames, wrist watch dials, brassiere clip, garter clasps), cosmetic-related items (eyelash curler, metal lipstick holders), daily use items (coins, keys, scissors, needles, handbags, pens, utensils, tools, cell phone, metal parts of furniture and doors) and nickel containing diet such as canned spaghetti and baked beans, green beans, peas including canned vegetables, canned fruit, dried fruit, nuts, cocoa and chocolate.

Patch testing should always be carried out in patients with suspected hypersensitivity to nickel. By this procedure, the patient in a natural way can be convinced about the logic involved in avoiding local rashes from direct contact between nickel-containing items and the skin. Therefore, in patients with localized dermatitis, information and education is probably the most important procedure to keep the patient free of rashes and thereby, avoid repeated boosting which could result in a higher level of sensitivity.

- Mechanical prevention of nickel dermatitis: adhesive or cellophane tape to cover nickel objects.
- Plastic sleeves and plastic cover for eyeglass frames and nickel handles.
- Talcum powder under metallic objects worn next to the skin acts in one of two ways. It may act as a mechanical barrier against the contact of nickel with the skin, and it may absorb perspiration, which dissolves some of the nickel from the metal object.

A number of substitutes can be used to prevent nickel dermatitis.

- Earrings may be made of stainless steel or gold.
- Substitution of plastic for metallic knitting needles and plastic bobby pins for the metallic variety.
- Plastic garter clips may replace the metallic variety.
- Jewellery may be coated with nail polish or resin solutions.
- Metallic buttons on blue jeans should be replaced with the stainless steel, plastic, or brass buttons.

- Cooking utensils made of aluminum, Teflon, and enamel are safest for nickel-sensitive individuals.
- In industry, nickel-sensitive worker should wear heavy-duty vinyl gloves.
- Medical devices such as various needles including acupuncture needles, dermojets, and heart valves should be made of 'all stainless steel'.
- Hairdressers and barbers should use stainless steel products.
- Safe ear piercing methods, plastic instead of stainless steel needles.
- Instructions for nickel sensitive patients in order to prevent the recurrence and prolongation of nickel dermatitis.

Nickel allergy may be minimized by the use of alloys with a nickel release rate of less than 0.5 $\mu\text{g}/\text{cm}^2$ per week for metal items designed for prolonged skin contact.¹¹

The dimethylglyoxime spot test is very useful for patients who are nickel allergic. Not only can they identify any nickel releasing item of jewellery or clothing accessories, but they can also use the test kit at home and at work to identify other sources of nickel contact.

References

1. Fisher AA. Nickel – The ubiquitous contact allergen. In: Fisher AA, ed. *Contact*

- Dermatitis*. Philadelphia: Lea and Febiger; 1988. P. 745-60.
2. Beck MH, Wilkinson SM. Contact Dermatitis. In: Burns T, Breathnach S, Cox N, Griffiths C, eds. *Rook's Textbook of Dermatology*, 7th edn. Oxford: Blackwell Publishing; 2004. P. 20.37-20.41.
3. Hjorth N. Clinical application of patch testing: The development of patch testing procedure and working for consistency. *J Am Acad Dermatol* 1989; **21**: 822-8.
4. Christensen OB. Nickel dermatitis. An update. *Dermatol Clin* 1990; **26**:112-5.
5. Nielsen HN, Menne T. Nickel sensitization and ear piercing in an unselected Danish population. *Contact Dermatitis* 1993; **29**: 16-21.
6. Andersen KE, Burrows D, White IR. Allergens from the standard series. In: Rycroft RJG, Menne T, Frosch PJ, eds. *Textbook of Contact Dermatitis*. Berlin: Springer-Verlag; 1992: 414-60.
7. Baja AK. Contact dermatitis. In: Valia RG, ed. *Textbook and Atlas of Dermatology*. Bombay: Bhalani Publishing House; 1994. P. 379-418.
8. Basketter DA, Briatico-Vangosa G *et al*. Nickel, cobalt and chromium in consumer products: a role in allergic contact dermatitis. *Contact Dermatitis* 1993; **28**: 15-25.
9. White Jr CR. Dermatopathology of contact dermatitis. In: Larsen WG, Adams RM, Maibach HI, eds. *Color Text of Contact Dermatitis*. Philadelphia, WB Saunders Company; 1992. P. 5-7.
10. Funk JO, Maibach HI. Horizons in pharmacologic intervention in allergic contact dermatitis. *J Am Acad Dermatol* 1994; **31**: 999-1014.
11. Menne T, Brandrup F, Thestrup-Pedersen K *et al*. Patch test reactivity to nickel alloys. *Contact Dermatitis* 1987; **16**: 225-59.