Nickel Sensitivity Among Patients with Contact Dermatitis: A Study at a Bangkok General Hospital*

Patcharee Sunthonpalin, M.D.

SUMMARY **Out of a total of 630 patients treated for contact dermatitis at Siriraj Hospital's Dermatology Clinic during 1978-1982, seventy-nine (12.54% of the total) reacted positively to the patch test for nickel sensitivity; during that period there was a trend towards greater incidence in the more recent years. Although the ratio of male to female cases was 18:61, the positive rates were not statistically different for either sex among the contact dermatitis patients: i.e., they were approximately 12 per cent. There was no obvious age prevalence.**

Sites of nickel dermatitis appeared to correlate with areas of exposure. Costume jewelry was found to be as frequent a source as occupational ones.

ASIAN PACIFIC J ALLERG IMMUN 1983;1 : 15-18.

Nickel, mercury and chromium are the most common causes of metal dermatitis,[1] since they are found in many inexpensive and commonly used metallic items such as zippers, watches, metallic watch-bands, coins, costume jewelry, cosmetics and foods.

During the past five years, the incidence of allergic contact dermatitis from nickel has increased in Europe and in the United States.[2] In Thailand, the incidence during the year 1972-1976 was reported to be 4.80 per cent,[3] which made it the fifth most common allergen at that time; subsequently, however, the increase has been conspicuously evident judging from clinical experience as well as skin testing. The purpose of the present study was to obtain detailed follow-up data and to determine the occupation of nickel-sensitive persons which hitherto had not been studied in Thailand.

MATERIALS AND METHODS

During the years 1978-1982, six hundred and thirty patients (147 male and 483 female) visiting the Dermatology Clinic at Siriraj Hospital for treatment of contact dermatitis were studied. Their ages ranged from 10 to 78 years (median, 27 years old).

All subjects were tested with 23 allergens as recommended by the International Contact Dermatitis Research Group (ICDRG).[4] The test materials, prepared by Trolabs of Denmark in the form of soft petrolatum with the exception of a formaldehyde solution, supplied in 5 ml disposable polypropylene syringes, were premounted on an aluminium-backed strip (Imeco Astra Agency Co. of Stockholm).

Test strips, affixed with 2-inch wide occlusive tape (Dermacel), were applied to each subject in vertical rows and removed at the end of 48 hours; at the same time the skin reactions were recorded as designated by ICDRG.[4]

RESULTS

Table 1 shows the annual incidence of nickel sensitivity during the five-year period. The overall incidence was 12.54 per cent (12.24 per cent in men and 12.68 per cent in women). There was no statistically significant difference between women and men among the total number tested ($p>0.05$). The respectively higher incidence of nickel sensitivity among patients with contact dermatitis during the period 1978 to 1982 was noted.

The age distribution of patients is shown in Table 2. There appears to be no prevalent age group.

Table 3 shows sites of skin lesions in relation to the apparent areas of contamination. Among 33 patients, there were 51 lesion sites related to the use of costume jewelry, the most common source being watch-bands; the remaining sources were the frames of spectacles, necklaces, and ear-rings. Involvement of the

*From the Allergy Section, Division of Dermatology, Department of Medicine, Faculty of Medicine Siriraj Hospital, Mahidol University, Bangkok 10700, Thailand.

Supported in part by the China Medical Board of New York, Inc.; Grant number 75-348-609.

Table 1 Incidence of nickel sensitivity during a five-year period

Year	Men			Women			Total
	Number tested	Positive Number	%	Number tested	Positive Number	%	+ ve %
1978	12	1	8.33	35	2	5.71	6.38
1979	5	1	20.00	33	1	3.00	5.26
1980	44	4	9.09	100	10	10.00	9.72
1981	31	4	12.90	129	17	13.18	13.12
1982	55	8	14.54	186	31	16.67	16.16
Total	**147**	**18**	**12.24**	**483**	**61**	**12.68**	**12.54**

Table 2 Age distribution

Age (years)	Number of patients tested	Number Positive			
		Men	Women	Total	%
< 16	16	0	0	0	0.00
16-20	114	2	16	18	15.79
21-30	238	7	24	31	13.03
31-40	110	3	8	11	10.00
41-50	78	3	5	8	10.25
51-60	55	2	6	8	14.54
61-70	17	1	2	3	15.00
⩾ 71	2	0	0	0	0.00
Total	**630**	**18**	**61**	**79**	**12.54**

hands and arms was related to occupational exposure. Among the remaining patients (Group 3), no definite incrimination could be made.

Table 4 shows the incidence of nickel dermatitis according to various occupations. Students and housewives comprised the largest group of patients with nickel sensitivity dermatitis related to the use of costume jewelry; in 26.50 per cent of the patients, sensitivity was acquired from their work.

DISCUSSION

During the years 1978-1982, out of a total of 630 patients with allergic contact dermatitis, 79 of them (12.54% of the total) were evidently nickel sensitive. Nickel was the second most common allergen identified at our skin clinic, according to unpublished data. The increase in prevalence from 4.80 per cent during 1972-1976[3] to 12.54 per cent during 1976-1982 in this series was similar to what occurred in Europe and the United States of America.[2] Table 5 lists the incidence of positive patch test for nickel sensitivity elicited in several countries. High rates were recorded in Canada, U.S.A., Spain, Switzerland, Belgium and Thailand. Lower rates were experienced in Japan, Poland, France, Brazil and Denmark. It must be pointed out here that since we used only 5% nickel sulphate in a petroleum base in the present study, there could be a significant number of false negatives.

The high prevalence of cases in relation to costume jewelry use indicates the popularity of inexpensive jewelry which contains nickel among adolescents, especially students. The frames of spectacles, on the other hand, are a common source in older people, while occupational hazards are prevalent in the middle-aged.

In other series, the majority of patients allergic to nickel comprised women; in the present series, the positive result expressed as a percentage of the patients tested was about the same for men and women, i.e., approximately 12 per cent.

In retrospect, the diagnosis of nickel dermatitis could be made correctly based on the location of lesions together with the history of exposure; the patch test yielded uniformly strong reactions in these patients. Eight patients (four men and four women) had contact dermatitis in periumbilical area apparently due to contact with metal buckles and buttons used in blue jeans; this kind of reaction has been reported.[5]

Hand eczema, which is also quite a problem in contact dermatitis, appears to be common in nickel allergy. Of the 24 patients with hand eczema in our study, 15 had a history of occupational contact with nickel.

The risk of hairdressers to nickel allergy is reportedly as high as 11 per cent;[6] the source is mainly shampoo, although hair-clips and other nickel plated metal objects can release nickel in the presence of ammonium thiocyanate which is an ingredient in permanent wave liquids.[7] Persons in other occupations involving, for example, electroplating, battery manufacture, gardening and cement work, are also vulnerable.

Among the nine women with hand dermatitis in whom a definite source of nickel exposure could not be identified, all were housewives; three of them had pompholyx type eczema. As already reported,[8,9]

Table 3 Sites and sources of nickel dermatitis

Sites	Number Men = 18	Number Women = 61	Sources	Total Sites
1. Related to use of costume jewelry				
Face	3	7	Spectacles (frame)	10
Waist-line	4	4 (2)	belts, buttons in jeans	10
Wrist	1 (2)	6 (5)	watches, watch-bands	14
Ear-lobes		1 (5)	Ear-rings	6
Neck		5 (4)	Necklaces	9
Finger		1	Rings	1
Upper chest		1	Locket	1
2. Related to occupation				
Hands	6	9		15
Arms	2	2		4
3. No definite source				
Face		8	? cosmetics	8
Scalp	1		? hair dye	1
Hands		9		9
Feet	1	8		9

Note: **Figures in parenthesis indicate number of patients who had skin lesions at more than one site.**

Table 4 Patients' occupations

Occupation	Men	Women	Total
Electroplaters	1	4	**5**
Cement workers	2	2	**4**
Tailors		3	**3**
Weavers		3	**3**
Hairdressers		2	**2**
Battery manufacturers		1	**1**
Furniture salesmen		1	**1**
Gardeners	1		**1**
Pig feeders	1		**1**
Students	2	13	**15**
Housewives		14	**14**
Civil servants	3	6	**9**
Merchants	5	3	**8**
Others	3	9	**12**
Total	**18**	**61**	**79**

Table 5 Patch test positive to nickel at various centres*

Centres	%
Glasgow, Scotland	16.0
Barcelona, Spain (1973-77)	14.89
Vancouver, Canada (1972-81)	14.7
NACDG**, USA (1972-74)	13.0
Present report (1978-82)	12.54
Geneva, Switzerland	12.2
NACDG, USA (1979-80)	12.0
Brussels, Belgium	11.3
Toronto, Canada (1977-79)	9.5
Salvador, Brazil (1976)	7.1
ICDRG, Europe	6.7
Odense, Denmark (1973-77)	6.4
Marseilles, France	5.1
Warsaw, Poland (1967-70)	4.9
Nagoya, Japan (1976-79)	4.3

*** Modified from Reference No. 2**
**** North American Contact Dermatitis Group**

food contaminated with nickel leached from stainless steel storage or cooking utensils, particularly in the presence of an acid solution, could be a source of nickel exposure in housewives. However, more than one allergen, viz., potassium dichromate, cobalt chloride, fragrance and epoxy resin, were found to give positive reactions among this group of patients with hand dermatitis, so nickel might be just one among other causative allergens.

Nickel sensitivity has been found among hospital cleaners;[10] in a cleansing process sufficient nickel was found to elicit nickel eczema.[11] This could be another source of nickel sensitivity in housewives. A recent investigation has shown that nickel penetrates rubber gloves but not vinyl ones;[12] the latter should therefore be recommended for the protection of patients with hand eczema.

Other than jewelry, cosmetics are another source of nickel which causes contact dermatitis of the

face. Nickel has been found in cosmetic containers themselves or as a contaminant in cosmetic materials such as the iron oxide used in brown pigment for eyelids[13] and even as a metal pellet in nail lacquer bottles.[14] In our series, nickel was one of the positive allergens in eight women who had facial cosmetic allergy and in one man with dermatitis of the scalp caused by hair dye.

REFERENCES

1. Fisher AA. Contact dermatitis, ed 2, Philadelphia: Lea & Febiger, 1973:87.
2. Lynde CW, Warshawski L, Mitchell JC. Screening patch test in 4,190 eczema patients 1972-1981. Contact Dermatitis 1982; 8:417-21.
3. Sunthonpalin P, Panich V. Prevalence of allergic contact dermatitis in Thailand. In: Reynold DC, Kotrajaras R, eds, Dermatology in Southeast Asia. Seameo-Tropmed Project, Bangkok, Thailand, 1978:170-3.
4. Wilkinson DS, Fregert J, Magnusson B, et al. Terminology of contact dermatitis. Acta Dermat-Venereol 1970; 50:287-92.
5. Brandrup F, Larsen FS. Nickel dermatitis provoked by buttons in blue jeans. Contact Dermatitis 1979; 5:148-50.
6. Shubert H, Prater E. Nickel allergy in hairdressers. Contact Dermatitis 1982; 8:414-5.
7. Dahlquist I, Fregert S, Gruvberger B. Release of nickel from plated utensils in permanent wave liquids. Contact Dermatitis 1979; 5:52-3.
8. Brun R. Nickel in food: The role of stainless-steel utensils. Contact Dermatitis 1979; 5:43-5.
9. Christensen OB, Moller H. Release of nickel from cooking utensils. Contact Dermatitis 1978; 4:343-6.
10. Clemmensen OJ, Menne T, Kaaber K, Solgaard P. Exposure of nickel and the relevance of nickel sensitivity among hospital cleaners. Contact Dermatitis 1981; 7:14-8.
11. Malten KE, Schutter K, van Senden KG, Spruit D. Nickel sensitization and detergents. Acta Dermat-Venereol 1969; 49: 10-3.
12. Wall LM. Nickel penetration through rubber gloves. Contact Dermatitis 1980; 6: 461-3.
13. Van Ketel WG, Liem DH. Eyelid dermatitis from nickel contaminated cosmetics. Contact Dermatitis 1981; 7:217.
14. Baren R. Pathology induced by the application of cosmetics to the nails. In: Frost P, Horwitz SN, eds, Principles of cosmetics for the dermatologist. London: CV Mosby, 1982:181-2.