

Reduced nickel sensitivity in young Danish women following regulation of nickel exposure

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In most western countries, nickel is the most common contact allergen among young women. In 1991, Denmark implemented a statutory order calling for the reduction of exposure to nickel in nickel-plated items in close contact with the skin. In a retrospective analysis, a comparison is made of the number of positive patch tests to nickel seen in a private practice of dermatology before and after this statutory order was implemented. From 1 January 1986 to 31 December 1989, 35 of 1135 (3.1%) men patch tested and 628 of 3024 (20.8%) women patch tested had positive reactions to nickel. From 1 January 1996 to 31 December 1999, 48 of 1104 (4.3%) men and 424 of 2193 (19.3%) women had positive patch tests to nickel. During the 1st period, 155 of 702 women under the age of 20 (22.1%) had positive patch tests to nickel, compared to 54 of 324 (16.7%) during the second period ($p < 0.05$). The most likely explanations of this decrease in nickel sensitivity are reduced exposure to nickel and increased public awareness of the risk of nickel sensitization.

Key words: nickel regulation; young women; patch test; nickel allergy; primary prevention.
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Nickel is the most common contact allergen in most parts of the world. In a German multicenter study, nickel sensitivity was shown to be as high as 18.3% among 36,720 women tested from 1990 to 1995 using the European standard series (1). A population-based study showed 11.1% of unselected Danish women to have positive patch tests to nickel (2).

Nickel sensitivity is not just a trivial problem of intolerance to skin contact with a non-precious metal. There is a statistical correlation between nickel sensitivity and hand eczema (3–5) and, in the period from 1984 to 1991, nickel was shown to be the most common contact allergen causing occupational dermatoses in Denmark (6).

A statutory order regulating the use of nickel in items intended for close contact with the skin was implemented in Denmark in 1991, in an effort to reduce the risk of nickel sensitization (7). Since then, it has been illegal to sell metal items intended for close contact with the skin, such as jewelry, spectacle frames, watches and jeans' buttons, if these items release more than 0.5 µg nickel/cm². A similar, but even stricter, code has been passed by the EU and will soon be implemented.

We were interested in evaluating our patch test data to determine whether this primary preventive

measure, in the form of the Danish statutory order, has had an impact on the rate of nickel sensitivity.

Patients and Methods

A retrospective analysis of the results of patch testing with nickel in a private practice of dermatology was carried out in two 4-year periods: 1 January 1986 to 31 December 1989; and 1 January 1996 to 31 December 1999. The 1st period was prior to the passing of the statutory order, while the 2nd period began 5 years after the order was implemented. Three full-time dermatologists were employed in the practice during both periods, and the referral pattern to the clinic was the same. All the patients were referred by general practitioners.

The same patch test technique was used during both periods. The patients were tested using the European standard series, including 5% nickel sulfate in petrolatum (Hermal). Finn Chambers were used. The test sites were occluded for 2 days (D) and read at D3. Additional readings were made if indicated. Test reactions of + or stronger were considered positive. Doubtful (?+) and irritant (IR) reactions were considered negative.

Table 1. Nickel allergy in 2 4-year periods, 1986–89 and 1996–99, in a total of 7456 patch-tested patients

Age (years)		1986–89		1996–99	
		men	women	men	women
0–20	Ni pos. (%)	9 (3.0%)	155 (22.1%)*	7 (5.3%)	54 (16.7%)*
	Ni neg.	294	547	126	270
	total	303	702	133	324
≥21	Ni pos. (%)	26 (3.1%)	474 (20.4%)	41 (4.2%)	370 (19.8%)
	Ni neg.	806	1848	930	1499
	total	832	2322	971	1869

* $p < 0.05$, χ^2 .

Results

A total of 4159 patients were patch tested in the 1st period and 3297 in the 2nd period. During the 1st period, 35 of 1135 men (3.1%) and 629 of 3024 women (20.8%) tested had positive patch tests to nickel, compared with 48 of 1104 men (4.3%) and 424 of 2193 women (19.3%) during the second period.

These results are presented in Table 1, where a distinction is made between patients who were less than 20 years of age at the time of testing and those who were 20 years old or older.

In both age groups, the % of nickel-sensitive men increased after the statutory order came into force, and among those older than 20, the absolute number also increased. From the 1st to the 2nd period of the study, there was a statistically significant reduction in the number of sensitized women under the age of 20, while there was a non-significant reduction among women 20 years old or older.

Discussion

The number of young women with positive patch tests to nickel, demonstrated using a routine patch test procedure, began to decrease 5 years or more after the implementation of a statutory order regulating the use of nickel in items intended for close, prolonged contact with the skin. We have shown that, among patients seen in our clinic in the 1970s and 1980s, nickel sensitization occurred in the early teens (8). It is, therefore, not surprising that the current study showed the rate of nickel sensitivity to be almost unchanged among women 20 years old or older. The women in this age group were probably sensitized before the statutory order came into force. Nickel-plated items were undoubtedly still in use for several years following implementation of this order.

The regulation soon to be carried out in EU member countries is likely to lead to an even lower rate of nickel sensitization among young Danish women. The EU regulation is stricter than the Danish regulation; thus, in future, the acquisition

of nickel-plated jewelry in other EU member states should not lead to nickel sensitization.

Johansen et al. (9) showed a decreased rate of nickel sensitivity among Danish women under the age of 18, while, at the same time, demonstrating an increase in the rate of fragrance sensitivity in all age groups.

Another factor which may have influenced the decrease in number of new cases of nickel sensitivity among young Danish women is the increasing awareness of nickel allergy in the population, resulting in the purchase of better quality jewelry. It is also possible that this awareness has resulted in the purchase of a higher quality of metal items used in the workplace in the hairdressing and catering trades and in some industries.

The increase in the rate of nickel sensitization among men may be due to the fact that ear-piercing and other types of piercing have become more common among men in recent years. In Sweden, 7.9% of enlisted men who had had their ears pierced were nickel sensitive, compared with 2.7% of men who had not (10).

In the current study, there was a marked decrease in the number of persons 20 years of age or younger who were tested. The pattern of referral to our clinic was the same during both periods of investigation. If there are fewer nickel-sensitized young women in the population who have dermatitis, then, clearly, fewer would be referred for testing. Another explanation applying to both sexes is that an increasing proportion of the younger generation attend school until they are about 20. Therefore, fewer young people are exposed to occupational allergens, including nickel. In recent years, an effort has been made to educate the labor force to protect themselves against occupational allergens, and the industrial working environment has also been improved by compulsory participation in occupational health centers.

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