

Nickel Allergy in Danish Women before and after Nickel Regulation

TO THE EDITOR: Over the 20th century, the prevalence of nickel allergy increased in Western Europe and the United States¹; this increase has been attributed to increased skin exposure to nickel in buttons, zippers, and other objects, earrings in particular. Nickel allergy may lead to nickel dermatitis at the site of contact and is a risk factor for hand eczema.² In 1990, the Danish government began regulating the release of nickel from consumer products including jewelry.³ We investigated the association between the initiation of nickel regulation and the prevalence of nickel allergy and nickel dermatitis.

We studied participants who were 18 to 69 years of age from two independent, random samples from the general population in Copenhagen: one identified in 1990 (543 participants) and the other in 2006 (3338 participants). All participants underwent nickel patch testing using the thin-layer rapid use epicutaneous (T.R.U.E.) test. Participants completed a questionnaire asking whether they had ever had their ears pierced, and if so, in what year, and whether they had ever had eczema on the skin under their watch strap, under the button of their jeans, or at the site

of earrings (suggesting nickel dermatitis). We hypothesized that the prevalence of nickel allergy and nickel dermatitis would decrease after nickel regulation, primarily among younger participants, in whom exposure to nickel would most likely be less than in older participants. We focused on women (274 women in 1990 and 1843 women in 2006), as the prevalence of ear piercing and nickel allergy is high in this subgroup.

A history of ear piercing was significantly associated with nickel allergy and nickel dermatitis in the 1990 study (Table 1), and the prevalence of dermatitis was significantly higher among women with nickel allergy than among those without allergy (81.2% vs. 30.5%, $P < 0.001$). Prevalences of nickel allergy and nickel dermatitis were significantly lower among women who had their ears pierced after the start of nickel regulation in 1990 (between 1990 and 2006) than among women who had their ears pierced before 1990 (allergy, 6.9% vs. 15.6%; $P = 0.004$; and dermatitis, 30.5% vs. 44.1%; $P = 0.004$). As expected, the decrease in prevalence was most pronounced among women 18 to 35 years of age. The prevalences of nickel allergy and nickel dermatitis

Table 1. Prevalences of Nickel Allergy and Nickel Dermatitis in Two Independent Populations of Women, from 1990, When Nickel Regulation Began, and 2006.

Age Group*	Condition†	Patch Testing in 1990 (N=274)		Patch Testing in 2006 (N=1843)			P Value‡
		Ears Pierced before 1990	Ears Never Pierced	Ears Pierced before 1990	Ears Pierced between 1990 and 2006	Ears Never Pierced	
		<i>number/total number (percent)</i>					
18–35 yr	Nickel allergy	21/95 (22.1)	0/11	28/174 (16.1)	12/145 (8.3)	1/32 (3.1)	0.002
	Nickel dermatitis	50/95 (52.6)	1/11 (9.1)	73/173 (42.2)	46/144 (31.9)	7/32 (21.9)	0.002
36–55 yr	Nickel allergy	6/67 (9.0)	2/57 (3.5)	109/736 (14.8)	3/39 (7.7)	5/117 (4.3)	0.82
	Nickel dermatitis	25/67 (37.3)	10/60 (16.7)	351/734 (47.8)	14/39 (35.9)	25/117 (21.4)	1.00
56–69 yr	Nickel allergy	1/17 (5.9)	0/27	22/307 (7.2)	2/62 (3.2)	4/181 (2.2)	0.62
	Nickel dermatitis	4/17 (23.5)	5/27 (18.5)	89/305 (29.2)	14/60 (23.3)	31/180 (17.2)	0.75
All	Nickel allergy	28/179 (15.6)	2/95 (2.1)	159/1217 (13.1)	17/245 (6.9)	10/330 (3.0)	0.004
	Nickel dermatitis	79/179 (44.1)	16/98 (16.3)	513/1212 (42.3)	74/243 (30.5)	63/329 (19.1)	0.004

* A total of 2117 women were tested: 475 women 18 to 35 years of age, 1031 women 36 to 55 years of age, and 611 women 56 to 69 years of age.

† Self-reported nickel dermatitis was defined as a “yes” answer to the question, “Have you ever had eczema under the fastener of your watch strap or under the button of your jeans or from wearing earrings?”

‡ P values were calculated for the comparison of the prevalence of nickel allergy or nickel dermatitis among participants whose ears were pierced between 1990 and 2006 (who underwent patch testing in 2006) and the prevalence of nickel allergy or nickel dermatitis among participants whose ears were pierced before 1990 (who underwent patch testing in 1990). The chi-square test was used for calculations except when the expected frequency for one of the two values being compared was lower than 5, in which case Fisher’s exact test was used.

were significantly higher among women whose ears were pierced between 1990 and 2006 than among those whose ears were never pierced. This may be explained by exposure to jewelry purchased outside Denmark, by exposures not affected by the nickel regulation,⁴ by a lack of compliance of manufacturers with the regulation, or by insufficiency of the regulation. The prevalence of nickel allergy among men was nonsignificantly higher among those with ears pierced before 1990 than those with ears pierced between 1990 and 2006 (6.5% vs. 3.3%).

Although the study design makes it impossible to determine cause and effect, these results suggest that regulatory control of nickel exposure may reduce the prevalence of nickel allergy.

Jacob Pontoppidan Thyssen, M.D.
Jeanne Duus Johansen, M.D., Ph.D.
Torkil Menné, M.D., Ph.D.
Gentofte Hospital
DK-2900 Hellerup, Denmark
jacpth01@geh.regionh.dk

Niels Henrik Nielsen, M.D., Ph.D.

Bagsværd Dermatology Clinic
DK-2880 Bagsværd, Denmark

Allan Linneberg, M.D., Ph.D.

Glostrup Hospital
DK-2600 Glostrup, Denmark

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