

Metal allergy in Singapore

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This is a clinical epidemiologic study to determine the frequency of metal allergy among patch-tested patients in the years 2001–2003. The results are compared with those of previous studies. All patients diagnosed as having allergic contact dermatitis in the National Skin Centre, Singapore, from January 2001 to December 2003 were studied retrospectively. The frequency of positive patch tests to the following metals were nickel 19.9%, chromate 5.6%, cobalt 8.2% and gold 8.3%. The frequency of nickel allergy has been steadily rising over the last 20 years. The most common sources of nickel allergy are costume jewellery, belt buckles, wristwatches and spectacle frames. After declining from 1984 to 1990, chromate and cobalt allergies have also been steadily increasing subsequently. The most common sources of chromate allergy were cement, leather and metal objects. Most positive patch tests to cobalt are regarded as co-sensitization due to primary nickel or chromate allergies. There has been a steep increase in positive patch tests to gold from 2001 to 2003, which is difficult to explain because the relevance and sources of such positive patch tests can rarely be determined with certainty. There has been an overall rise in the frequency of metal allergy in the last 20 years.

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As a group, metals and metal salts are the most common causes of allergic contact dermatitis in many countries. Nickel, chromium and cobalt allergens are present in almost all standard patch test series worldwide. In the National Skin Centre, Singapore, gold is also currently included in the standard series.

We have noted an increasing frequency in metal allergy among patch-tested patients in our centre over the last 20 years. In this study, we have examined the frequency of metal allergy in the years 2001–2003 and compared this to frequency figures from previous studies conducted at this centre over the last 20 years.

A further look into the relevance and sources of these metal allergies was taken, where such data were available.

Patients and methods

This was a retrospective epidemiologic study of all patients who had undergone patch testing at our centre from 1 January 2001 to 31 December 2003. These patients had been patch tested to our standard series and additional allergens where relevant. Patch testing was done according to

the protocol recommended by the International Contact Dermatitis Research Group (1).

The metal allergens that we studied were nickel sulfate 5% petrolatum (pet.), potassium dichromate 0.5% pet., cobalt chloride 1% pet. and gold sodium thiosulfate 0.5% pet.

Results

In total, 3047 patients had undergone patch testing at our centre during the study period. The frequencies of positive patch tests to the relevant allergens are summarized in Table 1. The relevance of these positive patch tests is summarized in Table 2. The frequencies and proportions of present and past relevant positive patch test results to these allergens are also summarized here.

All positive patch tests to nickel of present or past relevance were from metal objects. The most common sources of nickel allergy in those classified as having present and past relevance are summarized in Table 3. These are costume jewellery, belt buckles, wristwatches and spectacle frames.

The most common sources of positive patch tests to chromate which were of present or past

Table 1. Frequencies of positive patch tests to metal allergens

Patch tested (total)		Nickel sulfate		Potassium dichromate		Cobalt chloride		Gold sodium thiosulfate	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
2001	998	204	20.4	52	5.2	41	4.1	39	3.9
2002	1196	223	18.6	59	4.9	119	9.9	111	9.3
2003	853	180	21.1	58	6.8	91	10.7	104	12.2
Total	3047	607	19.9	169	5.6	251	8.2	254	8.3

Table 2. Relevance of positive patch tests to metal allergens

Allergen		Relevance recorded		Present relevance		Past relevance	
		<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
Nickel	607	528	87.0	139	26.3	222	42.0
Chromate	169	124	73.4	50	40.3	15	12.1
Cobalt	251	203	80.9	35	17.2	57	28.1
Gold	254	209	82.3	2	1.0	24	11.5

relevance were cement, leather and metal objects. The frequencies are summarized in Table 4.

Discussion

This study shows an overall increasing frequency of metal allergy in Singapore compared with previous studies at our centre in 1984–1985 (2), 1986–1990 (3) and 1992–1996 (4). The comparative data are summarized in Table 5.

Nickel remains the most common cause of contact allergy. The frequency of positive patch tests to nickel has been rising steadily from 13.9% in 1984–1985 to 19.9% in the current study. This is in line with trends reported worldwide. Exposure is through non-occupational exposure to costume jewellery, metallic accessories which are worn by patients and other metal objects, e.g. coins and metal tools. Women are more prone to nickel allergy than men due to ear piercing and costume jewellery. Although certain European countries have adopted legislative measures to limit nickel release in nickel-containing products, leading to decreasing incidence of sensitization to nickel in their younger population [Germany (5), Denmark (6, 7)], no such measures have yet been undertaken in Asian countries.

Chromate contact allergy is usually due to occupational sensitization in men exposed to cement in the construction industry. This had decreased from 6.3% in 1984–1985 to 2.7% in 1986–1990, but since then, it has risen to the current level of 5.6%. The initial decline in frequency had been attributed to successful preventive work measures practised by construction workers, and the subsequent rise may therefore perhaps be related to gradual relaxation of these measures due to complacency.

After a slight decline from 1984–1985 to 1986–1990, the frequency of positive patch tests to cobalt has also been rising in tandem with the increase in nickel and chromate allergy. Most positive patch tests to cobalt were associated with positive patch tests to nickel and chromate in the same individual. Pure cobalt allergy is uncommon. As such, most positive patch tests to cobalt are regarded as co-sensitization due to primary nickel or chromate allergies. In this study, 170 (67.7%) of 251 patients with positive patch test results to cobalt also had positive patch test results to nickel and/or chromate. Of those with no association with nickel or chromate, only 2 were assessed by their doctors to have present relevance due to contact with unspecified metal objects and 2 to have past relevance from costume jewellery.

Table 3. Most common sources of nickel allergy

Relevance	Source			
	Costume jewellery	Belt buckle	Wristwatch	Spectacle frames
Present	25	32	13	23
Past	133	4	18	8
Total	158	36	31	31

Table 4. Most common sources of chromate allergy

Relevance	Source		
	Cement	Leather	Metal
Present	27	11	3
Past	1	2	2
Total	8	13	5

No data on gold allergy were available from the previous studies as gold sodium thiosulfate had not been included in our standard series before the current study. However, there has been a steep increase in positive patch tests to gold in our current study, from 3.9% in 2001 to 12.2% in 2003. This is difficult to explain, as most cases (86.1%) have been classified to be of exposed or unknown relevance. Of 209 patients with positive patch tests to gold, only 2 were assessed to be of present relevance from gold jewellery, while 24 were assessed to be of past relevance, 9 of which were due to gold jewellery. 3 of the patients with positive patch tests to gold were assessed to be in our newly described relevance category of clinical tolerance, as they were still wearing gold jewellery at the time of the patch test but had no local skin reaction, although their patch tests to gold were positive.

References

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Table 5. Increasing frequency of metal allergy in Singapore

Years	Nickel (%)	Chromate (%)	Cobalt (%)	Gold (%)
2001–2003	19.9	5.6	8.2	8.34
1992–1996	19.4	3.8	6.6	NA
1986–1990	17.7	2.7	4.5	NA
1984–1985	13.9	6.3	4.7	NA

NA = not available.

According to National Skin Centre data, 1984–2003.

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