

Nickel dermatitis - Nickel excretion

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Nickel excretion in urine in four females sensitive to nickel with an intermittent dyshidrotic eruption was measured with flameless atomic absorption. Excretion of nickel was found to be increased in association with outbreaks of vesicles. The results support the idea that the chronic condition was maintained by ingestion of nickel in food.

Key words: Flameless atopic absorption - hand eczema - nickel sensitivity.

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Recently, Christensen & Møller (1975) found that the eruptions on the hands in patients sensitive to nickel in most cases were of the dyshidrotic type. An acute flare with eruption of a multitude of new vesicles was noted by the patients, intermittently. The authors were able to provoke such acute flares by giving the patients a capsule containing 5 mg of nickel. The daily intake of nickel with the food varies in Sweden between 0.6-4.6 mg, which suggests that the intermittent dyshidrotic eruption could be caused by an unusually high nickel intake occurring on certain days.

The present investigation was designed to study whether an increased nickel exposure in fact precedes the dyshidrotic eruptions in the nickel sensitive patient with hand eczema.

Material and Methods

This study comprises four females with contact sensitivity to nickel, with a chronic hand eczema and periodic vesicular eruption of the hands. (Table 1).

The patients were instructed to collect two 24-h urine samples. The first sample

was taken immediately after outbreak of vesicles and the other when there was no sign of hand eczema. Patient No. 1 was investigated twice.

Urine (50 ml) was used for nickel analysis. The sample was subjected to acid digestion (Nomoto & Sunderman 1970) and nickel was extracted into methylisobutylketone as a pyrrolidinedithiocarbamate complex. Nickel was measured in the organic phase by flameless atomic absorption on a Perkin-Elmer model 305 B with HGA graphite atomizer and D_2 - background corrector.

Results

The results are enumerated in Table 2. All four patients investigated have greater nickel excretion in urine in connection with outbreak of vesicles.

Discussion

Previously, experimental provocation of dyshidrotic eruptions after internal exposure to the antigen were described for chromate (Fregert 1965).

Table 1. Clinical details of patients

Patient no.	Age (years)	Age of onset of metal sensitivity	Age of onset of hand eczema	Duration of hand eczema (years)	Time interval for flare-up (weeks)
1	21	20	20	½	1-6
2	60	52	52	8	1-2
3	25	19	20	5	2-4
4	43	23	37	6	1-8

Table 2. Results: Nickel excretion in 24-h urines

Patient no.	Period with dyshidrotic eruption	Period with normal skin
1a	5.4 µg	1.5 µg
16	3.4 µg	1.2 µg
2	1.1 µg	0.3 µg
3	3.1 µg	1.2 µg
4	1.0 µg	0.0 µg

Flameless atomic absorption is a sensitive method for quantitative estimations of trace metals in biological materials. Measurements of nickel in urine are valid indices of environmental exposure to nickel (McNeely et al. 1972); the normal values were found to be 1.0-5.6 µg/24 h (Nomoto & Sunderman 1970).

The present results support the idea that

the intermittent dyshidrotic eruptions seen in patients sensitive to nickel were maintained by ingestion of the metal in varying amounts.

References

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