

Multicenter study of the frequency of contact allergy to gold

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Gold sodium thiosulfate (GSTS) is reputed to be the most reliable gold antigen, but control studies are still required. Although Koreans have more varied sources of contact with gold, such as herbal medicines with gold coatings and indwelling gold acupuncture needles, no epidemiological studies have been performed. This study examined the frequency and sources of contact allergy to gold in South Korea by a multicenter study. Patch testing with 0.5% GSTS in pet. was conducted in 255 eczema patients and 58 control subjects. Results were observed at 21 days (D) to ensure there were no undetected late reactions in 54 observed patients and 47 controls. 8 (3.1%) of the 255 patients reacted positively to GSTS, including 1 with a late reaction. 1 of the 58 controls showed a positive reaction to GSTS on D4 with a negative reaction on D14. Clinical relevance was lacking in the patients with positive reactions. Unexpectedly, the above particular sources of gold contact gave rise to few allergic reactions in our patients.

Key words: gold sodium thiosulfate; contact allergy to gold; patients; controls; late reaction.
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Although gold sodium thiosulfate (GSTS) has been considered to be the most reliable antigen for testing for gold contact allergy (1–3), results of patch tests with gold salts have been very variable. Studies with normal controls have been rare (4).

Besides the well-known sources of gold contact, such as jewelry, dental fillings, artificial dentures, orbital implants, cosmetics, systemic administration and occupational exposure, Koreans have been exposed to more varied sources of gold contact from their custom of taking herbal medicines or inserting gold acupuncture needles permanently into their bodies. No epidemiological studies have been made on contact allergy to gold in Korea, and this multicenter study was planned to determine the frequency and sources of contact, with a normal control comparison.

Subjects and Methods

Patients

The total number of patients participating in this study was 255. They were patch tested in 8 Korean University Hospitals from September 1998 to Feb-

ruary 2000 to diagnose their dermatoses suspected of contact dermatitis. The number of females was 197 (77.3%) and males 58 (22.7%). Their ages ranged from 7 to 74 years with the order of frequency as follows: 20s, 40s, 30s, 50s, 60s, 10s, more than 70, and less than 10. Eczematous lesions were located on the face in 142 cases, 24 periorally and orally, 24 on the neck, and 5 on the ears. Additionally, some patients showed other diseases, including atopic dermatitis in 12 patients, xerosis in 2, allergic rhinitis in 1, and prurigo in 1 patient.

According to the questionnaire, 139 patients wore golden jewelry, of whom 89 had ear-piercing. 88 had a dental item made of gold; 7 used cosmetics and/or soaps containing gold; 2 retained gold needles in their bodies.

Controls

Subjects without any detectable eczema were patch tested as controls, after obtaining their informed consent. The controls had no history of any eczema, except for 2 of them; 1 with atopic dermatitis, and 1 with stasis dermatitis.

Of the 58 controls, 48 (82.8%) were female and 19 (17.2%) were male. Their ages ranged from 8 to 61 years with the order of frequency as follows; 20s, 50s, 40s, 10s/30s, over 60, and less than 10.

According to the questionnaire, gold jewelry was worn by 37 persons of whom 18 had their ears pierced. 17 had gold dental fillings or crowns, and 4 used cosmetics containing gold. 21 were working in dentistry.

Antigens and their concentrations

GSTS (Pfaltz & Bauer, G04960) was purchased to prepare antigens. Sodium thiosulfate (STS) (Pfaltz & Bauer, S07415) was used to look for cross-sensitivity to GSTS. Both were prepared at 0.5% in petrolatum (pet.) for the tests. Potassium dicyanoaurate (PDCA) (Sigma, P1054) was prepared as 0.002% aqueous solution for patch testing in certain cases showing positive reactions to GSTS and STS. Nickel sulfate, potassium dichromate, cobalt chloride, ammoniated mercuric chloride, thimerosal and formaldehyde among Korean standard allergens (Chemotechnique Diagnostics, Kor-1000) were also used for patch testing.

Patch testing

Finn Chambers on Scanpor tape were used. The results were observed not only on day (D) 2 and D4, but also up to D14 or D21, to determine if there were late reactions, in 54 patients and 47 controls.

Questionnaire

All persons were requested to answer the questionnaire before patch testing for the purpose of identifying contact sources.

Analysis

Statistical significance was evaluated by the Pearson χ^2 -test or the Fisher exact test.

Table 1. Patch test results (positive reactions) in patients and controls

Reading time	Patients		Controls	
	GSTS	STS	GSTS	STS
D2	8/255 (3.1%)	2/255 (0.8%)	0/58	0/58
D4	7/255 (2.7%)	2/255 (0.8%)	1/58 (1.7%)	0/58
D7–D21	1/54	0/54	0/47	0/47

GSTS: gold sodium thiosulfate (0.5% pet.).

STS: sodium thiosulfate (0.5% pet.).

D: day.

Results

Patch testing results

Positive reactions were shown in 7 patients (2.7%) on D4. Positive late reactions appeared in another patient at D21. 2 of 8 patients displayed positive reactions to STS, but they also reacted positively to PDCA. Only 1 of the 58 controls reacted to GSTS on D4, and none showed late reactions (Table 1).

12 patients with concomitant atopic dermatitis did not react to GSTS. The reaction rates to the 6 standard allergens were not significantly different between the overall patient group and the patients reacting to GSTS.

Lesion locations and patch test reactions

6 cases of patients with positive reactions had lesions on their face; 1 case had lesions periorally while 1 had them on the ears. 2 cases had them on the neck and 1 had them on the scalp. Taking into consideration the location of lesions in the patient group, no statistical difference was found. However, the number of ear lesions in the patient group was too small to compare for statistical significance.

Gold exposure sources and patch test reactions

7 of 8 patients who reacted to GSTS wore gold jewelry, with 4 having their ears pierced. Gold dental items were found in 2 of the patients who reacted positively. 1 of the controls who reacted to GSTS had worn gold jewelry with ear piercing.

Discussion

In the patient group, the overall positive reaction rate to GSTS 0.5% pet. was 3.1% (8/255) including late reactions. Late reactions were observed in 54 patients (21.2%). If late reactions had been looked for in all 255 patients, the positivity rate might have been increased. 2 of the positive-reactive patients who showed reactions to GSTS and STS were considered to have a true gold allergy, because they also reacted positively to PDCA. The positivity rates were previously reported quite variably (1, 4–7), with the rate ranging from 12.4%/13% (1, 6) to 0.78% (7). Although the positivity rate does not necessarily imply current relevance, such an extent of variability in the reports is considered unusual compared to other common contact allergens.

The appropriate antigen was determined to be GSTS 0.5% pet. from studies with serial dilutions and various vehicles for different antigens. Testing in controls was rare (4) though still required. A

previous study (4) with patients and controls showed no significant difference in prevalence of GSTS hypersensitivity between patients and controls, as shown by our study (p value >0.05). Selecting controls does not seem to be easy, because the cutaneous manifestations of gold allergy have not been defined. The distribution of age and sex was similar between the patient group and the control group, although the occupational exposure to gold was higher (p value <0.05) in the control group. 1 of our 58 control subjects reacted to 0.5% GSTS without displaying a positive delayed reaction. The 1 positive-reactive control could wear gold jewelry without this causing any problems. The clinical relevance in our positive-reactive patients was minimal, as in other studies (8, 9).

The sources of contact in the patient group were not so different to other reports. Certain herbal medicines are coated in gold. Koreans have taken these herbal medicines to preserve their health as well as permanently inserting gold acupuncture needles to relieve bodily pain. However, the patients tested rarely used these sources of gold contact. Herbal medicines might be a rare source of gold contact allergy, but Koreans still have a tendency to ignore dermatological problems from herbal medicines. Further studies would be necessary to identify the rôle of herbal medicines and gold acupuncture needles.

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