

SKIN REACTIONS TO PRIMARY IRRITANTS IN MEN AND WOMEN

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Abstract. The skin reactions to skin provocation tests with 11 primary irritants were compared in 21 pairs of men and women with hand eczema, matched for age, and in 21 pairs of non-eczematous subjects. With a few exceptions, no statistically significant differences were demonstrated in the intensities of the skin reactions between the sexes. The general skin reactivity in tests with irritants seems to be the same in men and women.

Key words: Skin reactions; Irritants; Sex; Skin testings

Skin reactivity may be influenced by the sex of the subject. The pH was shown to be higher (1, 19) and buffering by the skin surface to be less effective (14) in females. It is often said that women's skin reacts more intensely than men's—with regard to washing the face with soap and water (3, 7, 10).

Skin provocation testing with alkaline irritants causes stronger reactions in women than in men (20). The same is true of detergents and is most evident in eczematous patients (18). On the other hand no sex differences were found in the skin reactions to croton oil (2, 22) or to benzene (12).

The present investigation was made with the purpose of comparing the skin reactions in men and women when tested with a series of eleven irritants applied simultaneously.

MATERIAL AND METHODS

Two series were tested, one consisting of 21 pairs of men and women with hand eczema and the other, of 21 pairs of men and women without eczema.

The 21 men and women were "matched" so that difference in age in each pair did not exceed 5 years. Children were not included. The age distribution in the two series was respectively: 20-30 years: 6 and 8; 31-40 years: 6 and 5; 41-50 years: 3 and 4; 51-60 years: 6 and 4.

The eczema was active and limited to the hands and included allergic and traumatic or irritant contact dermatitis. Patients with atopic dermatitis or dyshidrotic eczema were

excluded. None of the patients had any other major skin disease other than their hand eczema. Similarly, the non-eczematous individuals had never had any major skin disease.

Test methods

The tests were done on skin which was macroscopically normal. The test sites were the same in all subjects. The anterior and lateral parts of the legs were used for patch tests with primary irritants, the dorsal aspect for the alkali resistance test, the back of the thighs for open tests and the inner part of the upper arm for the cup tests.

The following test methods were used:

I. *Patch tests* (adhesion chamber technique of Rokstad) (17) with the following substances:

Sodium lauryl sulphate 3%, 1%, 0.5% in distilled water.
Benzalkonium chloride 2%, 1.5%, 1% in distilled water.
Sapo kalinus 50%, 30%, 10%, 5% in vaseline.
Hydrochloric acid 20%, 10%, 5%, 2% in distilled water.
Croton oil 0.5%, 0.4%, 0.3%, 0.2% in vaseline.
Cantharidine 0.01%, 0.007%, 0.005%, 0.004%, 0.003% in acetone.

For cantharidine, a cellulose patch test was used, as the diluting acetone damaged the plastic cup in the Rokstad test.

The patches were removed after 24 hours, the first reading was taken 15 minutes later and a second reading 48 hours later.

Two series of patch tests, 20% sodium lauryl sulphate and 1% mercury bichloride, both in distilled water, were applied to the skin for periods of 2, 4, and 6 hours. The first reading was taken at 18, 20, or 22 hours and the second reading at 48 hours.

II. *Cup test* (5) with potassium hydroxide 0.05%, 0.09%, 0.14% and 0.17% in distilled water. The exposure time was 2 hours and readings were taken at 24 and 72 hours.

III. *Open tests* (21) with phenol (20%, 15%, 12%, 10%, 7.5%, 3% in distilled water) and trichloroacetic acid (30%, 20%, 10%, 7.5% in distilled water). The reactions were read after 24 and 72 hours.

IV. *Alkali resistance test* according to Burckhardt-Locher (13).

Each individual tested was exposed to the same amount of each test substance.

Table I. Differences in the intensity of skin reactions between men and women in epicutaneous testings with primary irritants

Substance	Conc. (%)	Patients with hand eczema		Healthy individuals	
		24 hours	72 hours	24 hours	72 hours
Sodium lauryl sulphate	3	Not sign.	Not sign.	Not sign.	Not sign.
	1	Not sign.	Sign. $t = -2.14$	Not sign.	Not sign.
	0.5	Not sign.	Not sign.	Sign. $t = 2.17$	Not sign.
Benzalkonium chloride	2	Not sign.	Not sign.	Not sign.	Not sign.
	1	Not sign.	Not sign.	Not sign.	Not sign.
	0.5	Sign. $t = -3.25$	Sign. $t = -2.71$	Not sign.	Not sign.
Sapo kalinus	50	Not sign.	Not sign.	Not sign.	Not sign.
	30	Not sign.	Not sign.	Not sign.	Not sign.
	10	Not sign.	Not sign.	Not sign.	Not sign.
	5	Not sign.	Not sign.	Not sign.	Not sign.
Hydrochloric acid	20	Not sign.	Sign. $t = -2.51$	Not sign.	Not sign.
	10	Sign. $t = -2.77$	Sign. $t = -2.33$	Not sign.	Not sign.
	5	Not sign.	Not sign.	Not sign.	Not sign.
	2	Not sign.	Not sign.	Not sign.	Not sign.
Cantharidine	0.01	Not sign.	Not sign.	Not sign.	Not sign.
	0.007	Not sign.	Not sign.	Not sign.	Not sign.
	0.005	Not sign.	Not sign.	Not sign.	Sign. $t = 2.23$
	0.004	Not sign.	Not sign.	Not sign.	Sign. $t = 2.65$
	0.003	Not sign.	Not sign.	Sign. $t = -2.36$	Not sign.
Croton oil	0.5	Not sign.	Not sign.	Sign. $t = -2.09$	Not sign.
	0.4	Not sign.	Not sign.	Sign. $t = -2.36$	Not sign.
	0.3	Not sign.	Not sign.	Not sign.	Not sign.
	0.2	Not sign.	Not sign.	Not sign.	Not sign.
Potassium hydroxide	0.17	Not sign.	Not sign.	Not sign.	Not sign.
	0.14	Not sign.	Not sign.	Not sign.	Not sign.
	0.09	Not sign.	Not sign.	Not sign.	Sign. $t = -2.53$
	0.05	Not sign.	Not sign.	Not sign.	Not sign.
Phenol	20	Not sign.	Sign. $t = 2.17$	Not sign.	Not sign.
	15	Not sign.	Not sign.	Not sign.	Not sign.
	12	Not sign.	Not sign.	Not sign.	Not sign.
	10	Not sign.	Not sign.	Not sign.	Not sign.
	7.5	Not sign.	Not sign.	Not sign.	Not sign.
Trichloroacetic acid	30	Not sign.	Not sign.	Not sign.	Not sign.
	20	Not sign.	Not sign.	Not sign.	Not sign.
	10	Not sign.	Not sign.	Not sign.	Not sign.
	7.5	Not sign.	Not sign.	Not sign.	Not sign.
	<i>Exposure time (h)</i>				
Sodium lauryl sulphate	2	Not sign.	Not sign.	Not sign.	Sign. $t = 2.37$
	4	Not sign.	Not sign.	Not sign.	Not sign.
	6	Not sign.	Not sign.	Not sign.	Not sign.
Mercury bichloride	2	Not sign.	Not sign.	Not sign.	Not sign.
	4	Not sign.	Not sign.	Not sign.	Not sign.
	6	Not sign.	Not sign.	Not sign.	Not sign.

Registration of skin reactions

Numerical scoring was used as an expression of the skin reactivity in the patch tests, open tests and cup test. The naked eye appearance of test site was used to judge the severity of skin reactions. Separate index scales (0-7) were used to describe the morphology of the skin reactions to the different irritants—a low number signified a less severe and a high number a more severe reaction (4).

In the alkali resistance test the number of drops which resulted in a definite skin change was used as a measure of the skin resistance.

Error of methods

The error of measurement was estimated for each test method and for all the substances and their concentrations in each series. They were approximately 10-15% in the alkali resistance test 0% (4).

Statistical method

The *t*-test was used in testing the differences between the pairs of men and women. The level of significance was 0.05.

RESULTS

I. Epicutaneous test with primary irritants

The results of the comparisons between the intensities of the skin reactions in men and women are shown in Table I.

Only a few statistically significant differences were found between the sexes. No definite tendency towards stronger reactions in either sex was demonstrated. This applied both to the patients with hand eczema and to the non-eczematous subjects.

II. Alkali resistance test

There was no statistically significant difference between men and women, either in the eczematous patients or in the non-eczematous subjects.

COMMENT

In the present series the "matching" with respect to age was important, since this factor may influence the skin reactivity (6, 16, 23). Children were excluded, as they may show an increased skin reactivity as compared with adults (8, 9, 11, 15).

Of the total 84 comparisons of test results in men and women with hand eczema, the men reacted more strongly to 1 and the women to 6. Of the 84 comparisons in non-eczematous subjects the men reacted more strongly in 4 and the women in 4.

Thus no general tendency to stronger reactions could be demonstrated in either sex.

The results in the present investigation do not confirm that women in general react more vigorously than men to tests with primary irritants. This applies to the patients with localized hand eczema as well as to non-eczematous subjects. The 11 irritants used included one anionic detergent (sodium lauryl sulphate), one cationic detergent (benzalkonium chloride), one soap (sapo kalinus), one acid (hydrochloric acid) and two alkalis (sodium and potassium hydroxide—in the alkali resistance test), one agent provoking acantholysis (catharidine) and four irritants commonly used in experimental work on the skin (croton oil, phenol, trichloroacetic acid and mercury chloride).

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Received September 26, 1974

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