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Pruritus from allergy skin tests in children:

Comparing remedies

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Percutaneous skin testing is the standard diagnostic means for detecting IgE antibody to environmental allergens, food, Hymenoptera venoms, and some drugs. By measuring the size of the wheal and flare after 15 to 20 minutes, the presence and some estimation of the degree of type I allergic sensitization can be made.¹ Pruritus, which results from the release of mast cell mediators, is a common concern of patients, particularly children, after skin tests. Application of topical glucocorticoid creams and ointments to irritated skin where positive skin test results are apparent is done in some practices as itch relief, although this treatment has not been extensively studied, and the pharmacologic rationale is dubious. A single study of adults has evaluated the efficacy of steroid cream in skin test itch relief, finding no difference among steroid cream, moisturizing cream, and no treatment.²

This study was conducted to compare the efficacy of steroid creams with other interventions or no intervention in relieving skin test pruritus in children. The study was approved by the Nemours/Alfred I. duPont Hospital Institutional Review Board. Children aged 5 to 18 years undergoing allergen skin testing participated in this study, and written informed consent of the parent or guardian and assent of the child were obtained. Inclusion criteria were no antihistamine use in the previous week and 4 or more epicutaneous test results with a wheal of 3 mm greater than the saline control and a flare greater than 10 mm. Children included in the study were randomized by masked self-draw of a group number from an envelope that contained all groups: group 1, no intervention; group 2, ice cubes in plastic bag; group 3, 2.5% hydrocortisone cream; group 4, 1% hydrocortisone cream; group 5, tap water–moistened paper towel; and group 6, moisturizing cream (Eucerin). Children in groups 3, 4, and 6 were masked to the nature of the cream applied. Skin testing used a commercially available device (Greer-Pik) and commercial extracts (Greer, Lenoir, North Carolina), and test results were read 20 minutes after application. Immediately after reading a baseline itch severity score was recorded using a self-marked analog scale of 1 (no itch) to 100 (severe itch) adapted for pruritus from the Wong-Baker Faces Pain Rating Scale, which uses a progression of smiling to sad faces to reflect discomfort.³ Anti-itch interventions were applied, and itch severity was reassessed at 5 and 15 minutes using a new unmarked copy of the scale.

Categorical variables are shown as frequencies and percentages and quantitative variables as mean (SE). Repeated-measures analysis of variance compared mean changes in itch among

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intervention groups over time, with score changes from baseline to 5 and 15 minutes used as responses. Intervention group, time point of measurements, interaction of time points, and intervention were independent variables with analysis adjusted for baseline itch, age, sex, and race. Pairwise comparisons for overall mean changes of itch scores between the 5 intervention groups and the no intervention group were made. All tests are 2-tailed at significance of $P < .05$. SPSS statistical software, version 22 (SPSS Inc, Chicago, Illinois), was used for analysis.

A total of 147 children were recruited. Baseline and demographic characteristics were similar among the intervention groups (Table 1), but there were intergroup differences in distribution of sex, race, and age. Mean itch scores at any time points were not significantly different by sex or race (data not shown) but differed significantly among groups. Compared with group 1 (no intervention), mean reduction in itch scores was significantly greater in all intervention groups except group 5 (tap water) and group 6 (moisturizing cream). Group 2 (ice) provided the most significant itch reduction, but 2.5% hydrocortisone (group 3) and 1% cream (group 4) also gave significant reduction, whereas tap water and moisturizing cream gave insignificant suppression. The 2.5% hydrocortisone (group 3) and 1% hydrocortisone (group 4) treatments, although superior to no intervention (group 1), were not statistically superior to tap water in itch suppression at 15 minutes ($P = .79$ and $P = .99$, respectively).

The intervention of topical glucocorticoid applied to positive skin test result sites for itch suppression is of uncertain clinical value. The pharmacologic benefit of glucocorticoid preparation applied to the skin is related to these agents activating or repressing target genes in the nucleus of cells,⁴ and it is unlikely that this effect occurs within the brief duration of skin test pruritus. The data reported above indicate that hydrocortisone-containing creams relieve skin test pruritus significantly compared with no intervention; however, neither hydrocortisone dose (2.5% nor 1%) was superior to tap water, suggesting that the effect is nonspecific and questioning the benefits of topical steroids in this clinical situation. The finding of a greater than 50% reduction of pruritus absent all therapy after 15 minutes further illustrates the therapeutic overreach of topical steroids for skin test pruritus.

In summary, although some skin test itch suppression may occur from application of glucocorticoid creams, the comparable efficacy of less costly and potentially less toxic interventions makes steroid application inadvisable. The results of this study differ from those of Kelso,² who found no steroid effect. The differences may be explained by the study population above being children rather than adults in Kelso's study, or the smaller group size of 24 children vs the 40 adults in Kelso's study may have introduced variables. Despite the divergent findings, we concur with Kelso's conclusion that application of steroid-containing creams and ointments should not be used for skin test pruritus.

References

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Table 1

Baseline Characteristics, Demographics, and Itch Scores by Study Groups

Intervention	None (n = 24)	Ice (n = 24)	2.5% Hydrocortisone (n = 23)	1% Hydrocortisone (n = 27)	Tap water (n = 23)	Moisturizing cream (n = 26)	P value
Sex, No. (%) male	9 (37.5)	7 (29.2)	13 (56.5)	8 (29.6)	13 (56.5)	12 (46.2)	NA
Age mean (SE), 7	9.08 (0.61)	8.83 (0.71)	10.96 (0.85)	9.89 (0.48)	10.61 (0.81)	9.08 (0.60)	.14
No. of skin tests, mean (SE)	8.71 (0.85)	8.29 (0.88)	9.04 (1.06)	9.48 (0.80)	10.96 (1.34)	10.35 (1.34)	.46
Baseline itch score, mean (SE)	58.38 (6.31)	52.17 (5.15)	59.57 (6.99)	56.0 (4.62)	63.48 (4.36)	49.54 (5.11)	.51
5-Minute score, mean (SE)	37.92 (4.63)	16.75 (4.30)	28.0 (4.3)	28.43 (5.81)	33.7 (3.68)	34.62 (5.78)	NA
15-Minute score, mean (SE)	26.96 (3.83)	6.0 (2.94)	14.96 (3.94)	15.7 (3.96)	16.39 (3.27)	27.92 (5.69)	NA
Reduction at 5 minutes, %	35	68	52	50	46.9	30	NA
Reduction at 15 minutes, %	53.8	88	74.9	71.4	74.2	43.6	NA
P-value of reduction at 15 minutes		.001	.03	.046	.07	.70	NA

Abbreviation: NA, not applicable.