

Effects of Acupuncture on Control of Pruritus Associated with Atopic Dermatitis

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Abstract: Pruritus was induced experimentally in a total of 13 non-atopic subjects and subjects with atopic dermatitis, and the effects of acupuncture on the symptoms of pruritus were investigated. Acupuncture needles were inserted around the itching points (wheals 25 mm from the point of the induced pruritus). Suppression of itch was reported in both groups after 1 min of acupuncture stimulation. The suppressive effect had disappeared by 5 min. This suppressive effect of acupuncture stimulation on pruritus was evanescent and non-disease-specific, and did not affect the other arm.

Key Words: acupuncture stimulation, pruritus, experimentally induced pruritus, wheal reaction, atopic dermatitis, healthy subjects, evaluation of pruritus, non-disease-specific

1. Introduction

Atopic dermatitis, a chronic inflammatory disease, has become increasingly common because of recent changes in our living environment. Patients suffer from intense pruritus caused by chronic dermal lesions. Since scratching the skin as a form of relief exacerbates the dermatitis, control of the pruritus is essential to improve the patient's condition.

We previously investigated the effects of acupuncture on atopic dermatitis as a clinical treatment and found that acupuncture treatment was effective in controlling pruritus [1] [2].

In this study, we investigated the effects of acupuncture stimulation on the control of pruritus by experimentally inducing itching in subjects with and without atopic dermatitis [3] [4].

2. Methods

2.1. Subjects

The subjects were three people who did not have atopic dermatitis (males aged 22 to 36) and three patients with atopic dermatitis (males aged 25 to 30). Pruritus was induced five times in the subjects with no atopic dermatitis and eight times in the subjects with atopic dermatitis. All the subjects were students at this university.

2.2 Induction of pruritus

The sensitivity of each subject to environmental allergens was determined by conducting radioallergosorbent (RAST) tests on the blood. Allergens were injected into the skin of subjects in accordance with the results of the RAST tests, and histamine was injected into the skin of subjects who were insensitive to allergens. The wheals and pruritus that resulted from

these injections were observed. The solutions of histamine or allergen (dust mites, house dust, and pollen from Japanese cedar) employed to elicit the intracutaneous responses were diluted such that the diameter of the resultant wheals was 10 to 15 mm.

The intracutaneous injections were given on the ventral surface of the forearms. One of the arms received acupuncture treatment, and the other was observed as the control. In all cases, the reactions on both arms were designed to be as similar as possible at the start of the experiment (Fig. 1).

2.3. Evaluation of pruritus

A. In our previous clinical study, we attempted to evaluate pruritus on a scale of 0 to 3. However, subjects had difficulty subjectively distinguishing "very intense itching" from "intense itching." Thus, it was decided to use a simpler evaluation on a scale of 0 to 2:

Score 2: Intense itching

Score 1: Slight itching

Score 0: No itching

B. The sizes of wheals and areas of erythema were determined by measuring the maximum lateral and longitudinal diameters with digital calipers and multiplying the diameters.

C. The results are summarized in Table 1. Figures 3 and 4 were prepared from mean scores.

2.4. Experimental procedure

(1) Acupuncture stimulation: On one of the arms, disposable stainless-steel needles (0.16-mm acupuncture needles) were inserted at four points (upper and lower and right and left) on the circumference of a circle with a diameter of 5 cm surrounding the center of the itchy wheal; the needles touched the shallow musculature (less than 1 cm into the skin). These needles remained inserted for 5 min. Five pressure stimuli were applied as costimulation: 1) immediately before inserting the needles, 2) halfway through the acupuncture treatment,



Fig. 1 Intracutaneous injection for the induction of pruritus

and 3) upon removing the needles (Fig. 2). In addition to providing stimuli with acupuncture, costimulation is a method widely used in Japan to enhance the effects of acupuncture stimuli by pressing lightly two or three times on the skin around the acupuncture needles inserted during acupuncture treatment.

(2) Observations: Pruritus was judged immediately after removal of the needles (within 1 min) and 5, 10, and 15 min after removal. The sizes of wheals and erythematous areas were determined 15 min after removal of the needles. The numerical values obtained were verified by t-tests.

The experiment was conducted with the approval of the University's Ethics Committee.

3. Results

The experimental results are shown in Table 1 and Figures 3 and 4.

1) We investigated the effects of acupuncture on pruritus induced in subjects with and without atopic dermatitis. Acupuncture significantly reduced pruritus in non-atopic subjects at 1 min after needle insertion ($P=0.05$), but not at 5, 10, or 15 min (Fig. 3). Similarly, acupuncture significantly reduced pruritus in the atopic subjects at 1 min ($P=0.01$) but not at 5, 10, or 15 min (Fig. 4).

2) The effects of acupuncture in controlling pruritus were compared between both groups. No significant differences were observed in mean scores between atopic and non-atopic subjects at 1, 5, 10, or 15 min after the end of acupuncture stimulation (Table 1).

4. Discussion

1) We compared the effects of acupuncture in controlling pruritus in subjects with atopic dermatitis and non-atopic subjects. In both groups, acupuncture reduced pruritus by 1 min after needle insertion, but the effect had disappeared by 5 min, suggesting that acupuncture has a temporary and non-disease-specific effect in controlling pruritus.

2) Pruritus was induced with either an injection of a diluted solution of histamine or an intradermal reaction to a solution of allergen extracts. The allergens induced the immediate



Fig. 2 Control arm (bottom) with induced pruritus and arm subjected to acupuncture stimulation

Table 1. Changes in pruritus in response to acupuncture stimulation

Group A: Non-atopic subjects

Case	Arm	Changes in pruritus (score 0 to 2)					Wheal mm ²	Erythema mm ²
		Pre	1 min	5 min	10 min	15 min		
Group A1	No acupuncture	2	2	2	2	2	66	1116
	Acupuncture	2	0	2	2	2	104	1440
Group A2	No acupuncture	2	2	2	2	1	130	1800
	Acupuncture	2	0	2	2	1	121	1768
Group A3	No acupuncture	2	2	2	2	1	222	64
	Acupuncture	2	2	2	1	1	315	80
Group A4	No acupuncture	2	2	1	1	1	24	1408
	Acupuncture	2	0	0	0	0	12	844
Group A5	No acupuncture	2	2	2	2	1	105	2795
	Acupuncture	2	1	1	1	1	106	2808
SD	No acupuncture	0.00	0.00	0.45	0.45	0.45	74.66	995.61
	Acupuncture	0.00	0.89	0.89	0.84	0.71	111.21	1021.07

Group B: Atopic subjects

Case	Arm	Changes in pruritus (score 0 to 2)					Wheal mm ²	Erythema mm ²
		Pre	1 min	5 min	10 min	15 min		
Group B1	No acupuncture	2	2	2	2	2	138	—
	Acupuncture	2	2	2	2	2	125	—
Group B2	No acupuncture	2	2	1	1	0	187	924
	Acupuncture	2	0	0	0	0	184	928
Group B3	No acupuncture	2	2	2	2	2	79	924
	Acupuncture	2	0	1	2	2	124	1120
Group B4	No acupuncture	1	1	1	0	0	304.5	4575
	Acupuncture	1	1	1	1	1	311.5	5494
Group B5	No acupuncture	2	2	2	1	1	291.1	1296
	Acupuncture	2	1	2	1	1	276.7	1140
Group B6	No acupuncture	2	2	1	1	1	242	1102
	Acupuncture	2	1	0	1	1	351	1471
Group B7	No acupuncture	2	2	2	2	1	56	529
	Acupuncture	2	0	2	1	1	68	576
Group B8	No acupuncture	2	2	2	2	1	117	601
	Acupuncture	2	0	1	2	2	168	1089
SD	No acupuncture	0.35	0.35	0.52	0.74	0.76	94.84	1415.81
	Acupuncture	0.35	0.74	0.83	0.71	0.71	105.16	1551.33

Mean:

		Wheal	Erythema	1 min	5 min	10 min	15 min
Non-atopic	No acupuncture	109.4	1436.6	2.0	1.8	1.8	1.2
	Acupuncture	131.6	1388.0	0.6	1.4	1.2	1.0
Atopic	No acupuncture	176.8	1421.6	1.9	1.6	1.4	1.0
	Acupuncture	201.0	1688.3	0.6	1.1	1.3	1.3
All	No acupuncture	150.9	1427.8	1.9	1.7	1.5	1.1
	Acupuncture	174.3	1563.2	0.6	1.2	1.2	1.2

SD:

		Wheal	Erythema	1 min	5 min	10 min	15 min
All	No acupuncture	92.7	1255.3	0.3	0.5	0.7	0.6
	Acupuncture	109.7	1473.2	0.8	0.8	0.7	0.7

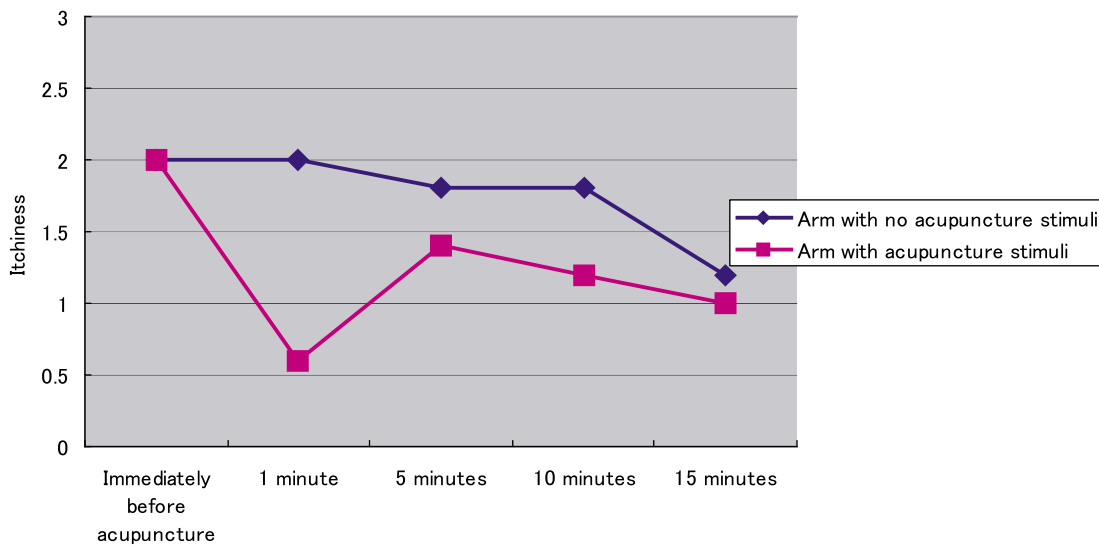


Fig. 3 Acupuncture-induced changes in pruritus in non-atopic patients

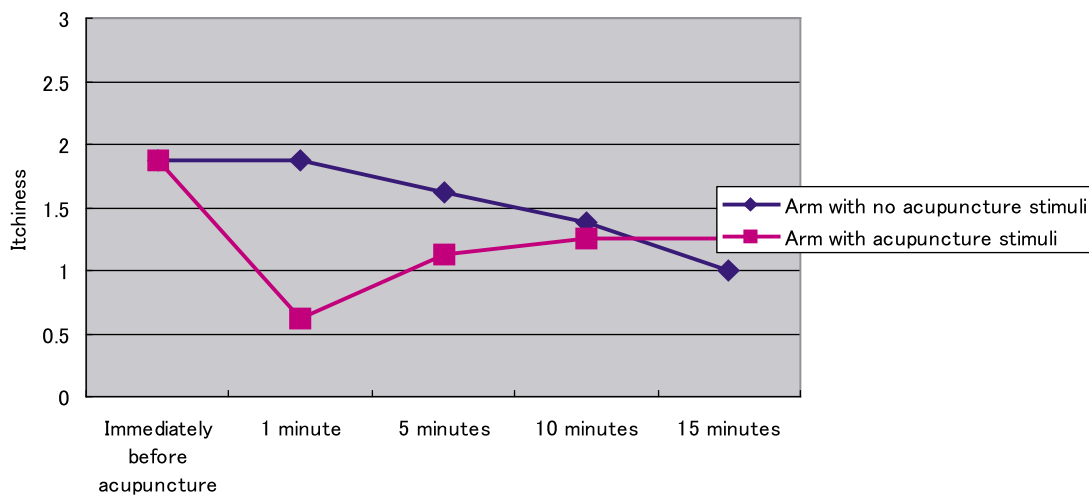


Fig. 4 Acupuncture-induced changes in pruritus in atopic patients

formation of wheals of a constant size, suggesting that the direct inducer was histamine released from the mast cells. Because acupuncture stimulation reduced pruritus without affecting the wheal reaction, acupuncture did not reduce the reactivity of the histamine receptors at the cellular or tissue levels; rather, it may have worked by controlling pain perception through a neurological mechanism.

3) Pfab *et al.* investigated the effects of acupuncture in controlling pruritus induced on the forearm by pricking the skin and applying histamine. They reported that the effects peaked after 5 min, and that effects in the control group disappeared after 10 min. Their results are very similar to the results of our experiment in terms of the time frame of the response. They applied acupuncture stimulation at points remote from the wheals on the meridian away from that supplying the area we stimulated. In our experiment, acupuncture needles were inserted around the wheal, only 25 mm from the point of injection, to investigate the direct effects of acupuncture. Pfab *et al.* reported that acupuncture had remote effects through this meridian. We found that acupuncture had almost no effects on the pruritic reaction on the other (control) arm.

4) Atopic dermatitis is an inflammatory disease of the skin characterized by pruritus. However, the mechanisms that produce pruritus are not fully understood. Increases in histamine levels and in the secretion of pruritus-inducing cytokines from T cells, and increases in sensitivity to the cytokines, may be involved. In this experiment, we showed that the effects of acupuncture in controlling the pruritus accompanying wheal formation induced by allergen or histamine injection were no different between subjects with atopic dermatitis and non-atopic subjects. This shows that although atopic dermatitis is characterized by intense pruritus, the effects of acupuncture on controlling pruritus are not disease-specific.

5) The mechanisms by which acupuncture controls pruritus are still poorly understood. However, pain is known to control pruritus. Pfab *et al.* reported that the effects of pruritus are transmitted to remote areas via acupuncture routes (5). Our results indicated that acupuncture had almost no effects on the pruritic reaction on the control arm, but further investigations should be made into the effects on the meridian on the same side

References

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