

Effects of Aromatherapy Acupressure on Hemiplegic Shoulder Pain and Motor Power in Stroke Patients: A Pilot Study

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ABSTRACT

Objectives: The aim of this study was to determine if aromatherapy acupressure, compared to acupressure alone, was effective in reducing hemiplegic shoulder pain and improving motor power in stroke patients.

Design: This work was a randomized, controlled trial.

Subjects: Thirty (30) stroke patients with hemiplegic shoulder pain participated in this study.

Intervention: Subjects were randomly assigned to either an aromatherapy acupressure group ($N = 15$) or an acupressure group ($N = 15$), with aromatherapy acupressure using lavender, rosemary, and peppermint given only to the former group. Each acupressure session lasted 20 minutes and was performed twice-daily for 2 weeks.

Outcomes Measures: Shoulder pain and motor power were the outcome measures used in this study.

Results: The pain scores were markedly reduced in both groups at post-treatment, compared to pretreatment (both aroma acupressure and acupressure group, $p < 0.001$). A nonparametric statistical analysis revealed that the pain score differed significantly between the 2 groups at post-treatment ($p < 0.01$). The motor power significantly improved at post-treatment, compared to pretreatment, in both groups ($p < 0.005$). However, there was no intergroup difference between two groups.

Conclusions: These results suggest that aromatherapy acupressure exerts positive effects on hemiplegic shoulder pain, compared to acupressure alone, in stroke patients.

INTRODUCTION

Shoulder pain is probably the most common musculoskeletal complication of hemiplegia resulting from stroke. As many as 16%–80% of patients who are hemiplegic after stroke experience shoulder pain at least once during their rehabilitation.¹ Suggested causes of shoulder pain include weakening of shoulder muscles by paralysis, and subluxation and joint fixation resulting from a decrease in motor power and spasticity.^{2–4} Patients with hemiplegic shoulder pain (HSP) remain hospitalized longer, and the pain also affects their rehabilitation.^{2,5–7}

Common pharmacological treatments include the use of nonsteroidal anti-inflammatory drugs for HSP, but these are

associated with adverse effects, such as dyspepsia and an increased risk of cardiovascular diseases in long-term use.⁸ The effectiveness of intra-articular triamcinolone acetone injections is variable, and is not recommended because of the high incidence of reported side-effects, such as adrenal suppression, dyspepsia, muscle weakness, and cutaneous depigmentation, and so forth.^{1,9–11}

Nonpharmacological interventions, such as exercise, biofeedback combined with relaxation techniques, electric stimulation, and deep, dry needling, are also used to treat HSP.^{12–15} Whereas these treatments may alleviate the HSP, their effectiveness has not been completely confirmed.^{16–18}

Aromatherapy involves the therapeutic use of plant-derived essential oils that can be absorbed by the body through

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the skin or the olfactory system. Commercially available essential oils have been used for several hundred years, and are commonly used for stress management and minor ailments.¹⁹ Many studies have found that olfactory stimulation produces immediate changes in pain level and physiological parameters, such as blood pressure, muscle tension, pupil dilation, blink magnitude, skin temperature, skin blood flow, electrodermal activity, pulse rate, and brain activity.²⁰⁻²⁶ However, as far as we are aware, the clinical therapeutic effects of aromatherapy acupressure on HSP have not been reported.

The aim of this study was to determine if aromatherapy acupressure with lavender, rosemary, and peppermint oils, which was reported as effective on pain reduction,²⁷ was effective in reducing HSP and improving motor power in stroke patients.

MATERIALS AND METHODS

Participants

The participants were selected from patients admitted to the Department of Oriental Rehabilitation Medicine at Wonkwang Medical Center Iksan, (South Korea) for the treatment of stroke as diagnosed with computed tomography or magnetic resonance imaging. A patient was eligible to participate in the program if he or she (1) had HSP after stroke, (2) was able to express the pain level and communicate in general, (3) was equal or below Grade 3 in motor

power of hemiplegic upper extremity, (4) exhibited no allergy to aromatherapy, and (5) agreed to the use of aromatherapy. Patients were excluded if they sustained shoulder pain caused by conditions other than hemiplegia, such as vertebral origin, visceral origin, fracture, inflammatory arthritis (e.g., rheumatoid arthritis, gout), dislocation, or fibromyalgia. The 30 subjects who were eligible for this study were randomly assigned to either an aromatherapy acupressure group ($N = 15$) or an acupressure-only control group ($N = 15$), using block randomization methods, with a random table by a secretary who was blinded to the experimental procedures.

This study received institutional approval from the Human Investigation Ethics Committee and administrative approval from the Human Subjects Review Board (HSRB) of the Wonkwang University Hospital and School of Medicine before we approached the subjects and obtained their written consent. The experiment would have been stopped if any adverse effects had occurred, with this being announced to the HSRB. However, no such effects occurred, and so the data from all the participants were available for analysis.

Outcome measures

It has been reported that many stroke patients are unable to successfully complete self-reported measurement scales, such as a visual analog scale.²⁸ Therefore, the pain level was measured with the Korean verbal pain rating system that was originally developed by Heft and translated into Korean.²⁹ The pain level experienced over the previous 24 hours was

TABLE 1. HOMOGENEITY FOR DEMOGRAPHIC CHARACTERISTICS OF SUBJECTS

	Aroma acupressure (n = 15)	Acupressure (n = 15)	χ^2 or U	p
Age, mean \pm SD (year) ^a	60.6 \pm 12.2	63.1 \pm 6.4	0.95 ^b	
Gender			0.00	1.00 ^b
Male	6 (40%)	5 (33%)		
Female	9 (60%)	10 (67%)		
Type of hemiplegia			0.14	0.71
Left side	7 (47%)	7 (47%)		
Right side	8 (53%)	8 (53%)		
Type of stroke			0.15	0.70
Infarction	10	10		
Hemorrhage	5	5		
Duration of interval between stroke onset and admission, mean \pm SD (days) ^a	21.4 \pm 21.2	31.8 \pm 18.9	0.54	0.46 ^b
Fingerbreath of subluxation			0.61	0.74
1/2	6 (40%)	7 (47%)		
1/2-1	7 (47%)	5 (33%)		
1-1 1/2	2 (13%)	3 (20%)		
Range of Motion (ROM, degree)			1.25	0.54
<90	3 (20%)	1 (7%)		
90 \leq ROM < 130	5 (33%)	5 (33%)		
130 \leq ROM	7 (47%)	9 (60%)		

Note. Values are expressed as no. (%) except ^aSD, standard deviation; and ^bMann-Whitney U-test.

TABLE 2. CHANGES IN HEMIPLEGIC SHOULDER PAIN AND MOTOR POWER BY AROMA ACUPRESSURE

Variables	Score	
	Pretreatment	Post-treatment
Shoulder pain		
Aroma acupressure ($N = 15$)	6.0 (6.0–6.0)	2.0 (1.0–2.0)*.***
Acupressure ($N = 15$)	6.0 (5.0–6.0)	4.0 (3–5.0)**
Motor power		
Aroma acupressure ($N = 15$)	2.0 (1.0–3.0)	4.0 (2.0–4.0)**
Acupressure ($N = 15$)	2.0 (1.0–4.0)	4.0 (2.3–4.0)**

Note. All results are presented as median (95% confidence interval). Pretreatment indicates before intervention; Post-treatment, 2 weeks after interventions.

* $p = 0.001$ by Mann-Whitney U-test between aroma acupressure and acupressure group; ** $p = 0.005$; *** $p = 0.001$ by the Wilcoxon signed rank test, compared to pretreatment.

rated on an 8-point scale, from “not at all” (0) to “very much so” (7). We used the pain levels averaged over 3-day periods before and after treatment.

The individual level of motor power was measured using the classification of American Academy of Physical Medicine and Rehabilitation.³⁰ This consists of 6 grades for motor power, from “no evidence of muscle contraction” (Grade 0) to “normal; can overcome a greater amount of resistance than a good muscle” (Grade 5). Outcome measures were assessed by a trained nurse who was blinded to the treatment of each group.

Intervention

The experimental treatment in this study involved providing aromatherapy acupressure to the experimental group in a treatment room in 20-minute sessions twice-daily for 2 weeks, giving a total of 28 treatments. The aromatherapy acupressure was provided in the form of acupressure, with essential oils of rosemary, lavender, and peppermint in a 2:1:1 ratio diluted to 3% in jojoba oil, at acupuncture points related to shoulder pain [Large Intestine (LI) 15 (Jian Yu), Small Intestine (SI) 9 (Jian Zhen), Triple Energizer (TE) 14 (Jian Liao), Gallbladder (GB) 21 (Jian Jing), SI 11 (Tian Zong), and SI 12 (Tian Zong)]. We selected these six major acupuncture points because of the high correlation between acupuncture points and trigger points (tender points with taut band-involved muscle³¹). Acupressure-only treatment was provided to subjects in the control group (dry acupressure) at the same acupuncture points.

Statistical analysis

The data were not normally distributed, and so the results are presented as medians and 95% confidence intervals (CIs). The CIs were calculated using standard software (CIA version 2.12, Southampton, UK). All outcomes were compared using the nonparametric Mann-Whitney U-test between 2 groups and the Wilcoxon signed-rank tests across treatment times for each group. A standard software pack-

age (Sigmatat version 3.1; Systat, CA) was used for all statistical calculations.

RESULTS

The demographic characteristics of the subjects are listed in Table 1. The groups did not differ significantly in age, gender, type of hemiplegia, type of stroke, duration of interval between stroke onset and admission, shoulder subluxation, or shoulder range of motion. All patients completed the study without dropout or withdrawal, and so the data from all the participants were available for analysis.

Table 2 lists the medians and 95% CIs for the pain scores and motor power in the aromatherapy acupressure and control groups, both pre- and post-treatment. The pretreatment pain scores did not differ between the 2 groups and were reduced in both groups at post-treatment, compared to pretreatment (both aromatherapy acupressure and control; $p < 0.001$). A nonparametric Mann-Whitney U-test revealed that the pain scores differed significantly between the groups at post-treatment ($p < 0.001$). The pretreatment motor power

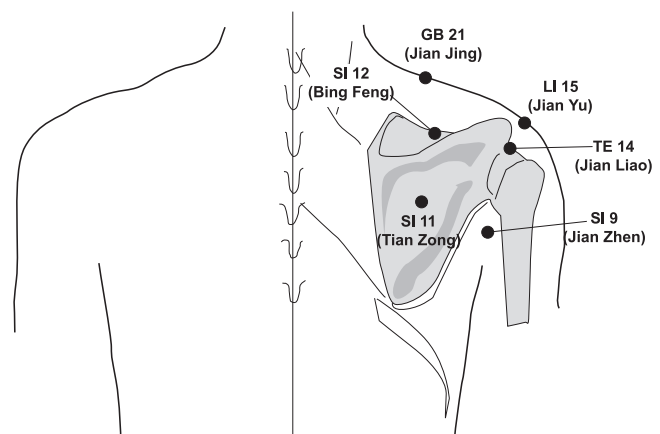


FIG. 1. Acupressure points used in this study.

did not differ significantly between the groups, nor did it differ significantly at post-treatment. However, there were significant improvements at post-treatment, compared to pretreatment, in motor power of both groups ($p < 0.005$).

DISCUSSION

In this study, the HSP in stroke patients was reduced more by aromatherapy acupressure than by acupressure alone. No significant differences were noted in motor power between two interventions. These findings appear to be consistent with recent studies on the effects of aromatherapy on several types of pain. The aromatherapy groups included in previous studies reported less pain, and were more relaxed, after each session.^{20–22,32–35} The reduced pain level found in this study may result from an enhancement of the parasympathetic response through the effects of touch and smell that encourage relaxation.²⁷ Relaxation has been shown to alter the perception of pain, and there have been several reports on the positive effects of acupressure and aromatherapy on pain.^{27,36–38} However, we know of no previous report on the effects of aromatherapy acupressure or acupressure alone on HSP.

Several other therapies have exhibited high efficacy in the treatment of HSP. The reduction in HSP induced by percutaneous neuromuscular electrical stimulation (78%) is similar to that produced by aromatherapy acupressure in this study (72%).³⁹ The reduction in HSP by aromatherapy acupressure in this study is greater than the improvement produced in stroke patients by a combination of electromyogram biofeedback and relaxation techniques (48%).¹⁵ Moreover, intramuscular electric stimulation and deep dry needling for HSP has achieved pain reductions of 72.2% and 59.8%, respectively.^{13,14} However, these results are difficult to compare quantitatively owing to the use of different assessment measures for evaluating HSP, and the use of both invasive and noninvasive therapies for relieving the pain. A clinically controlled comparison of several different noninvasive therapies for stroke patients with HSP, using the same form of pain assessment, would be valuable.

Although we found that aromatherapy acupressure improved the HSP, compared to the acupressure-only group, additional evaluation of long-term effects of aromatherapy acupressure is needed for clinical application. In addition, we have not assessed the possible placebo effects in this study.

There were several potential limitations in this study. One potential limitation of this study would be the feasibility of this intervention to generalize (2 times daily may be difficult). Future studies should look at a less frequent use of a similar intervention. Another potential limitation was that we did not include no-treatment and aromatherapy-alone groups, and the clinical measures used in this study should have assessed pain level and range of motions⁴⁰ more objectively. Moreover, this study had a small sample size, and the heterogeneity of shoulder pain in stroke patients, to gen-

eralize these results. Thus, further randomized studies that would include more objective measures, multiple measurements, and long-term follow-up are needed to clarify whether aromatherapy acupressure has any definitive effect on pain score, range of motion, or any other psychological and physiological variables of HSP, in stroke patients.

CONCLUSIONS

In summary, our data suggest that aromatherapy acupressure reduces HSP in stroke patients and does so more effectively than acupressure alone. Both interventions are effective at improving motor power (no intergroup difference). As far as we are aware, this study represents the first attempt to assess the effects of aromatherapy acupressure on HSP in stroke patients. However, the authors cannot discount the possibility that a placebo effect during each intervention was responsible for the improvements produced by both treatments. Future studies, using a strong experimental design, will enable us to examine possible placebo effects and to assess the clinical effectiveness of the application of aromatherapy acupressure in stroke patients with shoulder pain.

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