



Randomised trial of trigger point acupuncture compared with other acupuncture for treatment of chronic neck pain

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KEYWORDS

Trigger point;
Chronic neck pain;
Elderly;
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Summary

Introduction: There is some evidence for the efficacy of acupuncture in chronic neck pain (CNP) treatment, but it remains unclear which acupuncture modes are most effective. Objective was to evaluate the effects of trigger point acupuncture on pain and quality of life (QOL) in CNP patients compared to three other acupuncture treatments (acupoints, non-trigger point and sham treatment).

Methods: Forty out-patients (29 women, 11 men; age range: 47–80 years) from the Department of Orthopaedic Surgery, Meiji University of Oriental Medicine, with non-radiating CNP for at least 6 months and normal neurological examination were randomised to one of four groups over 13 weeks. Each group received two phases of acupuncture treatment with an interval between them. The acupoint group (standard acupuncture; SA, $n = 10$) received treatment at traditional acupoints for neck pain, the trigger point (TrP, $n = 10$) and non-trigger point (non-TrP, $n = 10$) groups received treatment at tenderness points for the same muscle, while the other acupuncture group received sham treatments on the trigger point (SH, $n = 10$). Outcome measures were pain intensity (visual analogue scale; VAS 0–100 mm) and disease specific questionnaire (neck disability index; NDI, 60-point scale).

Results: After treatment, the TrP group reported less pain intensity and improved QOL compared to the SA or non-TrP group. There was significant reduction in pain intensity between the treatment and the interval for the TrP group ($p < 0.01$, Dunnett's multiple test), but not for the SA or non-TrP group.

Conclusion: These results suggest that trigger point acupuncture therapy may be more effective on chronic neck pain in aged patients than the standard acupuncture therapy.

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Introduction

Chronic neck pain (CNP) can be caused by dysfunction of a variety of structures within the

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neck but specifically excludes systemic problems such as rheumatoid arthritis.¹ It is usually associated with unspecified degenerative changes that include osteoarthritis. Therefore, a wide range of treatments are used including drugs, physical medicine methods, manual treatments, immobilization, local or epidural injection and patient education. However, there is still a lack of consensus about optimal management.² Increasingly, patients are turning to complementary methods, like acupuncture, where conventional treatments are ineffective or unpleasant.³ The results of acupuncture trials which have used control groups like physiotherapy,^{4,5} sham acupuncture⁶ or no-treatment controls,⁷ are contradictory and have not provided evidence for the efficacy of acupuncture in the treatment of CNP.^{8–10}

The common conclusion is that all studies conducted so far lack adequate design and methodology including adequate control of the quality of the administered acupuncture. However, the method of point selection in published trials seems to be more simple and formulary than that used in the standard acupuncture practice at our clinic. We believe that the response to acupuncture and therefore the success of a trial depend substantially on the choice and the number of points treated.

Our main aim in this study was to determine if acupuncture at trigger points is an effective treatment for CNP, when compared to existing, widely used acupuncture at standard acupuncture points.

Methods

Patients

Patients aged 45 years or over with a history of neck pain were recruited from the Meiji University of Oriental Medicine Hospital specifically for the study. Inclusion criteria were: (1) neck pain for a duration of 6 months or longer; (2) no radiation of neck pain; (3) normal neurological examination findings of cervical nerve function, including deep tendon reflexes, voluntary muscle action, and sensory function. Exclusion criteria were: (1) major trauma or systemic disease; (2) other conflicting or on-going treatments except those who had been medicated with unified dosage for a month or longer.

Patients who gave written informed consent were enrolled and randomly allocated to the standard acupuncture (SA) group, who received traditional acupoints for neck pain, or the trigger point acupuncture (TrP), non-trigger point acupunc-

Measures

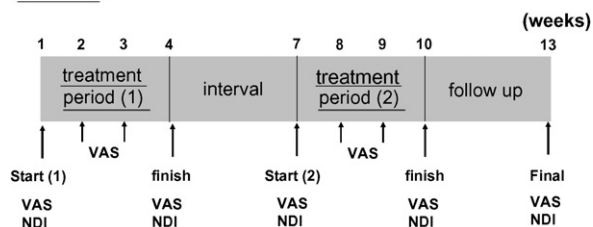


Figure 1 Flow chart of design in this trial. Evaluation was performed immediately before each treatment. VAS: visual analogue scale, NDI: neck disability index.

ture (non-TrP) or sham acupuncture (SH) groups, using a computerised randomisation program. Ethical approval for this study was given by the ethics committee of Meiji University of Oriental Medicine.

Design

The design of this study was a blinded, randomly sham-controlled, clinical trial. The four groups received two phases of acupuncture treatment with an interval between the two phases. Each phase was 3 weeks and the total experiment period was 13 weeks (Fig. 1). Each patient received a total of 6 treatments, one per week, each lasting for 30 min.

Blinding

Patients were blinded to their treatment. They were told before randomization that they would be allocated to one of four groups. The measurements were performed by an independent investigator who was not informed about the treatment sequence or the treatment the patient received before each measurement.

Treatment

Standard acupuncture (SA) group

The SA group received treatment at traditional acupoints for neck pain. After a literature review on acupuncture for neck pain, only widely accepted acupoints were selected.^{10–12} The standard points in the cervical region (local points) were GB 20 and 21, BL 10 and 11, S 12 and 13; standard points on the upper extremity (distal points) were TE 5, LI 4 and SI 3 (Fig. 2). In the SA group, disposable stainless steel needles (0.2 mm × 40 mm, Seirin Co. Ltd.) were inserted into the muscle (to a depth of 20 mm) and the 'sparrow pecking' technique (alternate pushing and pulling of the needle) was applied. When the subject felt dull pain or the acupuncture sensation (*de qi*), the manipulation was stopped and the needle was left in place for 10 more minutes.

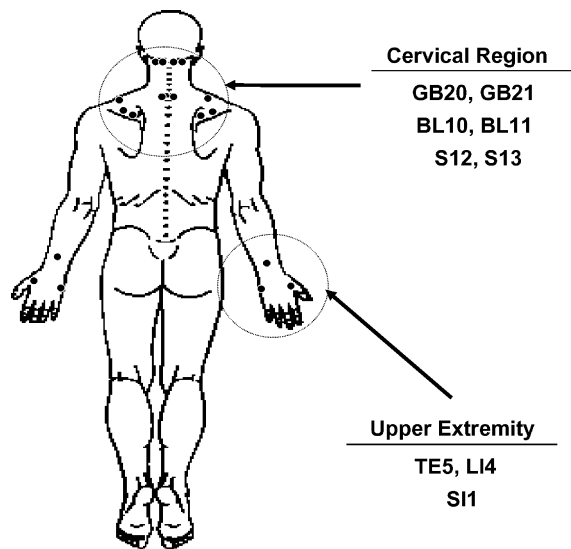


Figure 2 Acupuncture points used for treatment of the standard acupuncture group.

Trigger point acupuncture (TrP) or non-trigger point (non-TrP) group

The TrP group received treatment at trigger points. The correct application of the technique requires experience in palpation and localisation of taut muscle bands and myofascial trigger points. Precise needling of active myofascial trigger points provokes a brief contraction of muscle fibres. This local twitch response should be elicited for successful therapy, but it may be painful and post-treatment soreness is frequent.^{13,14} In this study, the most important muscles of the cervical and upper extremity were examined for myofascial trigger points (Table 1).

On the other hand, the non-TrP group received treatment at non-tender points. The non-tender point chosen had no tenderness or taut muscle band. However, the point was selected in the same muscle as the trigger point and away from the trigger point by 50 mm.

Table 1 Muscles treated in the trigger point acupuncture group

Muscle	Trigger point	Non-trigger point	Sham
M. Splenius capitis	3	2	4
M. Trapezius	5	4	3
M. Sternocleidom	3	4	2
M. Scalenus	4	5	2
M. Levator scapulae	3	4	3
Paravert M.	2	2	4
M. Suboccipitales	1	0	2
Other	0	2	1

Disposable stainless steel needles (0.2 mm × 50 mm, Seirin Co. Ltd.) were inserted into the skin over the trigger point. The needle was advanced a further 20 mm into the muscle. The 'sparrow pecking' technique was then applied. The manipulation was stopped when the local twitch response was elicited, and the needle was left in place for a further 10 min. The mean number of insertions was 2.3 in TrP group to and 2.4 in non-TrP group.

Sham acupuncture (SH) group

The SH groups received treatment at trigger points. The methods of choosing trigger points were the same. For the SH group, similar stainless steel needles (0.2 mm × 50 mm) were used, but the tips had been cut off to prevent the needle penetrating the skin. The cut ends were smoothed with sandpaper manually under clean conditions.¹⁶ The acupuncturist pretended to insert the needle and to use the sparrow pecking technique, then removed the needles. A simulation of needle extraction was performed after 10 min, by touching the patient and noisily dropping needles into a metal case. The mean number of inserted was 2.6.

The acupuncture was performed by acupuncturists who had 4 years of acupuncture training and 2 or 7 years of clinical experience.

Evaluation

Primary outcome measures were pain intensity, quantified using a 10 cm visual analogue scale (VAS), and pain disability,¹⁵ measured using the neck disability index (NDI).¹⁶ The NDI consists of 10 questions with six possible responses (range 0–50 points, the worst condition being 50).

The VAS measures were assessed immediately before the first treatment (pre) and 1–3, 6–9, and 12 weeks after the first treatment. The NDI measures were assessed before the first treatment and 3, 6, 9, and 12 weeks after the first treatment. The VAS and NDI measures were completed by participants immediately before each treatment (Fig. 1).

Assessment of blinding technique

To examine the efficacy of the blinding technique of the study, the subjects were asked to select an answer for the question 'How did you feel when the acupuncture needle was inserted?' at the end of the first phases. The available answers were: (1) needles were inserted into muscle; (2) needles did not penetrate the skin; (3) I could not discriminate the difference.

Statistical analysis

The data are reported as means $\pm$ standard deviation (mean $\pm$ S.D.). Dunnett's test was used for within-group comparisons of overall VAS scores and NDI. The assessment of the blinding procedure was analyzed by chi-square test.

StatView for Windows (Version 5.0) was used for the statistical analysis. A p value of <0.05 was defined as statistically significant.

Results

Patient characteristics

Forty patients (29 women, 11 men; age range: 47–80 years) were randomised and started treatment (Fig. 3). No differences were found among the

four groups in the variables measured at baseline including age, disease, pain duration, VAS and drug use (Table 2).

Patient progress through the trial is shown in (Fig. 3). One patient in the SA group, 1 patient in the TrP group, 1 patients in the non-TrP group, and 2 patients in the SH group dropped out as they had no response to treatment. Also, 1 patient in the SA group, 1 patient in the TrP group, and 1 patient in the SH group dropped out due to adverse effects (deterioration of symptoms). The drop out rate was not different among the groups ($p = 0.97$, Mann–Whitney's U test). The analyses were performed on the 31 patients who completed the study.

VAS score

As shown in Fig. 4 and Table 3, the mean VAS scores tended to decrease from 3 weeks after the first

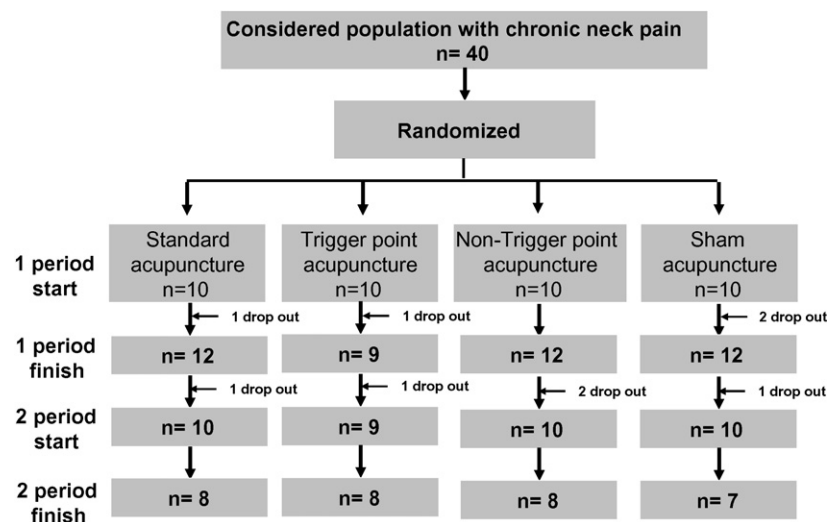


Figure 3 Participation flow in the study. 9 patients were excluded after they dropped out.

Table 2 Characteristics of patients included in RCT of acupuncture

Treatment	Standard acupuncture	Trigger point acupuncture	Non-trigger acupuncture	Sham acupuncture
Sample size	8	8	8	7
Age	62.3 $\pm$ 11.0	62.3 $\pm$ 10.1	65.0 $\pm$ 10.5	65.0 $\pm$ 10.5
Disease				
Spondylosis	5	5	6	5
Discopathy	3	3	2	2
Radiculopathy	1	2	1	0
Pain duration (y)	3.2 $\pm$ 3.1	2.9 $\pm$ 2.7	3.3 $\pm$ 3.9	2.3 $\pm$ 1.5
VAS (mm)	69.5 $\pm$ 18.6	67.0 $\pm$ 13.2	70.9 $\pm$ 14.0	64.1 $\pm$ 20.7
Drug				
Povltice	7	6	7	6
Analgesic	2	3	1	2
Vitamin D	1	1	2	1

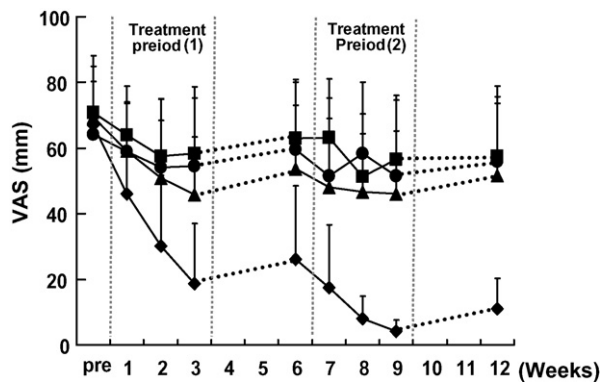


Figure 4 Effect of acupuncture on VAS score for chronic neck pain. There were significant reductions in pain intensity between the treatment and the interval for the trigger point acupuncture group ($p < 0.01$, Dunnett's multiple test). By the end of treatment, the trigger point acupuncture group reported less pain than the other groups, in which the differences were not significant. (▲) standard acupuncture group ($n = 8$); (□) trigger point acupuncture group ($n = 8$); (■) non-trigger point acupuncture group ($n = 8$); (●) sham acupuncture group ($n = 7$).

treatment, although the time courses among the groups were different. In the TrP group, statistically significant differences were seen when comparing the VAS scores pre-treatment (67.0 ± 13.2 mm) with 3 weeks later (18.6 ± 18.5 mm, $p < 0.01$, Dunnett's multiple test). This improvement was also continued by interval period (26.1 ± 22.3 mm, $p < 0.05$, Dunnett's multiple test). However, there were no significant differences between pre-treatment scores and later scores for the SA, non-TrP or SH groups.

By the end of the second treatment (9 weeks after the start of treatment), the TrP group reported relatively lower pain intensity than the SA, non-TrP or SH groups, and the differences were only statistically significant in TrP group ($p < 0.01$, ANOVA).

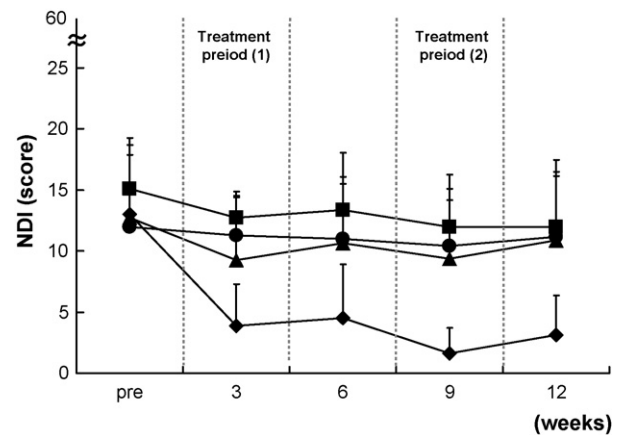


Figure 5 Effect of acupuncture on Neck Disability Index scores in chronic neck pain. By the end of treatment, the trigger point acupuncture group showed the greatest improvement in scores. The notation is the same as in Fig. 4.

Functional impairment

As shown in Fig. 5 and Table 4, mean NDI scores tended to decrease at 3 weeks after the first treatment, although the time courses were different among the groups. In the TrP group, a statistically significant difference was observed comparing pre-treatment score (13.0 ± 6.3) with 3 weeks later (3.9 ± 3.4 , $p < 0.01$, Dunnett's multiple test), but there were no significant reductions in the scores for this period in the SA, non-TrP or SH groups.

By the end of the second course of treatment, the TrP group reported less pain intensity compared to the SA, non-TrP or SH groups, and the difference was only statistically significant in TrP group ($p < 0.01$, ANOVA).

Assessment of the blinding technique

In the present procedure, 75.0% in SA group, 50.0% in TrP group, 50.0% in non-TrP group and 57.1% in the SH group answered that they received the

Table 3 Mean $\pm$ S.D. pain scores (VAS)

Weeks	SA group	TrP group	Non-TrP group	SH group
1	69.5 $\pm$ 18.6	67.0 $\pm$ 13.2	70.9 $\pm$ 14.0	64.1 $\pm$ 20.7
2	59.1 $\pm$ 14.6	46.1 $\pm$ 16.3	64.0 $\pm$ 10.0	59.0 $\pm$ 20.0
3	50.9 $\pm$ 17.5	30.3 $\pm$ 21.5	57.6 $\pm$ 17.3	54.1 $\pm$ 20.7
4	45.9 $\pm$ 17.5	18.6 $\pm$ 18.5	58.4 $\pm$ 16.9	54.6 $\pm$ 20.0
7	53.8 $\pm$ 19.3	26.1 $\pm$ 22.3	63.0 $\pm$ 17.8	59.6 $\pm$ 20.5
8	48.1 $\pm$ 20.9	17.5 $\pm$ 19.1	63.1 $\pm$ 17.9	51.6 $\pm$ 23.6
9	46.6 $\pm$ 17.8	8.0 $\pm$ 6.9	51.3 $\pm$ 19.0	58.4 $\pm$ 21.7
10	46.1 $\pm$ 19.0	4.1 $\pm$ 3.6	56.6 $\pm$ 19.5	51.4 $\pm$ 23.3
13	51.6 $\pm$ 22.0	11.0 $\pm$ 9.3	57.6 $\pm$ 18.0	53.9 $\pm$ 23.0

Table 4 Mean $\pm$ S.D. Neck Disability Index

Weeks	SA group	TrP group	Non-TrP group	SH group
1	12.6 $\pm$ 6.0	13.0 $\pm$ 6.3	15.1 $\pm$ 2.7	12.0 $\pm$ 3.6
4	9.3 $\pm$ 5.2	3.9 $\pm$ 3.4	12.8 $\pm$ 2.1	11.3 $\pm$ 3.3
7	10.6 $\pm$ 7.4	4.5 $\pm$ 4.4	13.4 $\pm$ 2.7	11.0 $\pm$ 4.5
10	9.4 $\pm$ 5.8	1.6 $\pm$ 2.1	12.0 $\pm$ 4.2	10.4 $\pm$ 3.7
13	10.9 $\pm$ 6.6	3.1 $\pm$ 3.2	12.0 $\pm$ 4.5	11.1 $\pm$ 5.0

needle insertion to the muscle, whereas a second phase of 12.5% in SA group, 12.5% in TrP group, 12.5% in non-TrP group and 28.6% in SH group answered they had no penetration of the needle. There was no significant difference between in the proportions groups ($\chi^2 = 2.21$, $p = 0.89$).

Discussion

In the present study, there was a statistically significant difference between the TrP acupuncture and other acupuncture treatments, 3 weeks after the first phase. These results suggest that trigger point acupuncture treatment may be more effective than other acupuncture treatments for chronic neck pain in aged patients.

Chronic neck pain is a major medical and social problem causing severe discomfort and reduced ability to work.¹⁷ In many cases pain is correlated with limited cervical spine mobility.¹⁸ A wide range of treatments are used including drugs, physical medicine methods, manual treatments, etc. On the other hand, acupuncture treatment has been used for pain relief for a long time. Several studies have examined the efficacy of acupuncture treatment for such conditions, however, the results have been mixed.^{9,10,19}

In evaluating the efficacy of acupuncture, three important parameters are the site, mode and intensity of the stimulation.²⁰ For assessing the parameter 'stimulation site', one can define the number of stimulation sites and their location (traditional acupoint or tender point/trigger point). In most previous studies, the stimulation sites were traditional acupoint or non-trigger points. These results suggest that the stimulation site is important, and the acupuncture stimulation of myofascial trigger points might be most effective on chronic neck pain in elderly patients.

On the other hand, the importance of the sham-controlled randomized clinical trial (RCT) to control for the strong placebo effects of acupuncture

has been debated.^{21,22} There are many acupuncture RCTs in which various control groups have been employed, such as no-treatment controls,²³ mere pricking (without penetration),²⁴ minimum acupuncture (shallow and weak needling),²⁵ mock transcutaneous electrical nerve stimulation (TENS; without current pulse),^{26,27} and so on. However, in most previous studies, positive results were obtained in studies that used a non-acupuncture control group,^{23,28} and negative results tended to be reported in those that used sham acupuncture or mock TENS.^{29,30} Therefore, the choice of control might be very important. The sham acupuncture technique used in this study was very simple. We used a needle that had previously had its tip cut off so that it was blunt. The practitioner applied the same procedure as with the real acupuncture. Blinding in this study appears to have been successful.

Effectiveness of the trigger point as a treatment site of acupuncture

The myofascial trigger point has been defined as a highly localised and hyper-irritable spot in a palpable taut band of skeletal muscle fibres.¹⁴ Important characteristics of a myofascial trigger point include local pain or tenderness, referred pain or referred tenderness, and local twitch response.¹³ Acupuncture or dry needling of a myofascial trigger point appears to provide immediate relief of pain related to that myofascial trigger point.^{31,32} However, the most effective point of acupuncture is still unclear.

In this study, clinical results suggested that trigger points have a better analgesic effect than non-trigger points or traditional acupuncture points. The strength of stimulation may depend on different parameters such as the manipulating procedure, the size of needle and the site of needle insertion. It seems evident that there would be differences in the effects of trigger point and other point insertion because of the different sites that are stimulated. The trigger point insertion of the needle affects sensitised nociceptors, whereas non-trigger point or acupuncture point insertion does not always affect sensitised

nociceptors.^{33–35} Myofascial active trigger points are supposed to be sites where nociceptors, such as polymodal-type receptors, have been sensitised by various factors.³⁶ In particular, sensitised nociceptors might be possible candidates for the localised tenderness, referred pain and local twitch response.^{34,37} These data suggest that acupuncture stimulation of myofascial active trigger points may produce greater activation of sensitised polymodal-type receptors, resulting in stronger effects on pain relief.

Acknowledgments

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