Introduction
Chronic low back pain (LBP) is a major health problem in modern society. Seventy to eighty five percent of the population will experience back pain at some time in their lives. Each year, 5–10% of the workforce is off work because of their LBP, but most of them are off for less than seven days. Almost 90% of all patients with acute LBP recover quite rapidly, regardless of therapy. The remaining 10% are at risk of developing chronic pain and disability and account for more than 90% of the social costs for back incapacity. The proportion of elderly patients who have LBP is greater than that of young adults.

In younger adults most back pain arises from the physical stresses on normal spinal structures, whereas in the elderly, osteoarthrosis of the intervertebral joints and/or osteoporosis with collapse of the vertebral bodies is almost invariably present. Analgesia in the elderly is frequently unsatisfactory, and the incidence of adverse drug reactions, particularly to non-steroidal anti-inflammatory drugs (NSAIDs), is well known. For this reason, many patients request physical therapies such as acupuncture.

Acupuncture has been frequently applied to chronic LBP. A number of randomised controlled trials on acupuncture for chronic LBP have already been published. In 1997, during the NIH Consensus Conference, and more recently in...
systematic reviews indicating equivocal results, the question was asked: can acupuncture contribute to the conservative treatment of chronic LBP? The common conclusion was that all the studies conducted so far lacked adequate design and methodology, including adequate control of the quality of the administered acupuncture. Furthermore, 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 depends to an important degree on the choice and the number of points needled.

Our main aim in this study was to determine whether acupuncture at trigger points is an effective treatment for chronic LBP in the elderly, when compared to standard acupuncture at traditional points.

**Methods**

**Patients**

Patients aged 65 years or over with a history of LBP were recruited from the Meiji University of Oriental Medicine Hospital specifically for the study. Inclusion criteria were (1) lumbar or lumbosacral LBP for a duration of six months or longer; (2) no radiation of LBP; (3) normal neurological examination findings of lumbosacral nerve function, including deep tendon reflexes, plantar response, voluntary muscle action, straight leg raising, and sensory function; and (4) no previous treatment with acupuncture for LBP. Exclusion criteria were (1) major trauma or systemic disease; and (2) other conflicting or on-going treatments. However, patients were included with medical conditions if there had been no change in drugs or dosage taken for one month or longer.

Patients who gave written informed consent were enrolled and randomly allocated, using a computerised randomisation programme, to one of three groups: the standard acupuncture (SA) group, who received acupuncture at traditional points for LBP, or the group that received superficial needling to trigger points (S-TrP) or the group that received deep needling to trigger points (D-TrP). Ethical approval for this study was given by the ethics committee of Meiji University of Oriental Medicine.

**Design**

The study was a subject and assessor blinded, randomised, controlled clinical trial. The three groups received two phases of acupuncture treatment with an interval between the two phases (the original design was a crossover study). Each phase lasted three weeks and the total experiment period was 12 weeks (Figure 1). Each patient received a total of six 30 minute treatments, one per week.

**Blinding**

Patients were blinded to their treatment. They were told before randomisation that they would be allocated to one of three treatments. The measurements were performed by an independent investigator who was not informed about the treatment allocation.
Treatment

The SA group received treatment at traditional points for LBP. After a literature review on acupuncture for LBP, only widely accepted acupoints were selected.\(^8\)\(^-\)\(^1\(^\)\(^1\) The standard points in the lumbar region (local points) were BL23, 25, and GB30; standard points on the lower extremity (distal points) were BL40, 60 and GB34. Additionally, up to four ah shi points of greatest tenderness were chosen, which were often close to, but not necessarily identical to, BL54, 31 and 32 (Figure 2). In the SA group, disposable stainless needles (0.2mm x 40mm, Seirin Co Ltd) were inserted into the muscle (to a depth of 20mm) 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 retained for ten more minutes.

The S-TrP and D-TrP groups received treatment at trigger points. The correct application of the technique requires experience in palpation and localisation of tender points in taut bands of skeletal muscle (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.\(^1\(^2\)\(^-\)\(^3\)\)

In this study, the most important muscles of the lumbar and lower extremity were examined for myofascial trigger points (Table 1). In the trigger point acupuncture treatment groups, disposable stainless needles (0.2mm x 50mm, Seirin) were inserted into the skin over the trigger point. In the S-TrP group, insertion was to a depth of about 3mm; in the D-TrP group the needle was advanced a further 20mm into the muscle. The ‘sparrow pecking’ technique was then applied. In S-TrP group, when the subject felt a kind of dull pain or acupuncture sensation (de qi), the manipulation was stopped and the needle retained for ten more minutes. In contrast, in D-TrP group the manipulation was stopped when the local twitch response was elicited, and the needle retained for a further ten minutes. The mean number of insertions was 2.3.

The acupuncture was performed by an acupuncturist who had four years of acupuncture training and seven years of clinical experience.

Evaluation

Primary outcome measures were pain intensity, quantified using a 10cm visual analogue scale (VAS), and pain disability,\(^1\(^4\) measured using the Roland Morris Questionnaire (RMQ).\(^1\(^5\)\) The RMQ consists of 24 questions answered yes or no (range 0–24 points, the worst condition being 24).

The VAS measures were assessed immediately before the first treatment (pre) and one, two, three, six, seven, eight, nine, and twelve weeks after the first treatment. The RMQ measures were assessed before the first treatment and three, six, nine, and twelve weeks after the first treatment. The VAS and RMQ measures were completed by participants immediately before each treatment (Figure 1).
Statistical analysis
The data are reported as means ± standard deviation (mean±SD). The nonparametric Tukey, Dunnett’s multiple test, Fisher’s exact test and one-way ANOVA (StatView v5; SAS Institute Inc, NC) were used for the statistical analysis. The level for statistical significance was set at P<0.05. Comparisons were made before and after each treatment, and between three kinds of intervention.

Results

Patient characteristics
Thirty-five patients (25 women, 10 men; age range: 65–81 years) were randomised and started treatment. No differences were found between the three groups regarding the variables measured at baseline including age, disease, pain duration, VAS and drug use (Table 2).

Patient progress through the trial is shown in Figure 3. Four patients in the SA group and three
patients in the S-TrP group dropped out as they had no response to treatment. Also, one patient in the D-TrP group dropped out due to adverse effects (deterioration of symptoms). The dropout rate was not statistically different between the groups (P=0.49, Fisher’s exact test). The analyses were performed on the 27 patients who completed the study.

Table 3  Mean ± standard deviation of pain scores (VAS)

<table>
<thead>
<tr>
<th>Week</th>
<th>S-TrP Group</th>
<th>D-TrP Group</th>
<th>SA Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>65.6 ± 17.1</td>
<td>65.6 ± 17.3</td>
<td>64.0 ± 20.2</td>
</tr>
<tr>
<td>2</td>
<td>64.8 ± 17.5</td>
<td>50.8 ± 21.0</td>
<td>61.0 ± 23.1</td>
</tr>
<tr>
<td>3</td>
<td>50.1 ± 25.8</td>
<td>40.3 ± 21.0</td>
<td>55.0 ± 21.6</td>
</tr>
<tr>
<td>4</td>
<td>48.2 ± 30.5</td>
<td>33.1 ± 19.2</td>
<td>53.7 ± 21.9</td>
</tr>
<tr>
<td>7</td>
<td>52.7 ± 29.3</td>
<td>52.9 ± 22.5</td>
<td>56.8 ± 24.4</td>
</tr>
<tr>
<td>8</td>
<td>48.9 ± 30.8</td>
<td>41.8 ± 18.1</td>
<td>51.3 ± 25.1</td>
</tr>
<tr>
<td>9</td>
<td>53.9 ± 25.0</td>
<td>30.0 ± 13.4</td>
<td>46.4 ± 23.0</td>
</tr>
<tr>
<td>10</td>
<td>48.3 ± 27.9</td>
<td>23.1 ± 9.1</td>
<td>43.2 ± 23.1</td>
</tr>
<tr>
<td>13</td>
<td>50.1 ± 32.5</td>
<td>44.4 ± 19.1</td>
<td>56.8 ± 25.1</td>
</tr>
</tbody>
</table>

Figure 4  Effect of acupuncture on VAS score for chronic LBP. There were significant reductions in pain intensity between the treatment and interval for the deep trigger point acupuncture group (P<0.01, Dunnett’s multiple test). By the end of treatment, the deep trigger point acupuncture group reported less pain than the other groups (difference not significant).

■: standard acupuncture group (n=9), ▲: superficial trigger point acupuncture group (n=9), ◆: deep trigger point acupuncture group (n=9).

As shown in Figure 4 and Table 3, the mean VAS scores tended to decrease from three weeks after the first treatment, although the time courses among the groups were different. In the D-TrP group, statistically significant differences were seen when comparing the VAS scores pre-treatment (66±17mm) with three weeks later
However, this improvement was reversed by the end of the interval (53±23mm). Significant improvements were again shown for VAS for the D-TrP group comparing pre-treatment and follow up (P<0.01, Dunnett’s multiple test). There were no significant differences between pre-treatment scores and later scores for the SA or S-TrP groups.

By the end of the second treatment (nine weeks after the start of treatment), the D-TrP group reported relatively lower pain intensity than the SA or S-TrP groups, although the differences were not statistically significant (ANOVA).

Table 4  Mean ± SD Roland Morris Questionnaire scores

<table>
<thead>
<tr>
<th>Week</th>
<th>S-TrP Group</th>
<th>D-TrP Group</th>
<th>SA Group</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5.0 ± 1.7</td>
<td>9.8 ± 1.9</td>
<td>7.5 ± 4.8</td>
</tr>
<tr>
<td>4</td>
<td>3.7 ± 2.8</td>
<td>4.8 ± 3.1</td>
<td>3.7 ± 2.8</td>
</tr>
<tr>
<td>7</td>
<td>5.1 ± 3.3</td>
<td>6.8 ± 3.8</td>
<td>5.9 ± 4.0</td>
</tr>
<tr>
<td>10</td>
<td>4.9 ± 3.6</td>
<td>3.8 ± 2.9</td>
<td>4.7 ± 3.7</td>
</tr>
<tr>
<td>13</td>
<td>4.3 ± 2.2</td>
<td>4.2 ± 1.2</td>
<td>4.2 ± 4.3</td>
</tr>
</tbody>
</table>

Figure 5  Effect of acupuncture on Roland Morris Questionnaire scores in chronic LBP. By the end of treatment, the deep trigger point acupuncture group showed the greatest improvement in scores, but the difference was not significant. The notation is the same as in Figure 3.

(33±19mm, P<0.01, Dunnett’s multiple test). Functional impairment

As shown in Figure 5 and Table 4, mean RMQ scores tended to decrease at three weeks after the first treatment, although the time courses were different between groups. In the D-TrP group, a statistically significant difference was observed comparing pre-treatment score (9.8±1.9) with three weeks later (4.8±3.1, P<0.01, Dunnett’s multiple test), but there were no significant reductions in the scores for this period in the SA or S-TrP groups. By the end of the second course of treatment, the D-TrP group reported less pain intensity compared to the SA or S-TrP groups, but
the difference was not statistically significant (P>0.5, ANOVA).

Discussion
In the present study, there was a statistically significant reduction in both pain VAS and RMQ in the D-TrP group over the first treatment period, and for VAS over the whole time of treatment. There was no significant reduction in pain or RMQ for and SA or S-TrP groups. These results suggest that deep trigger point acupuncture therapy may be more effective than other forms of acupuncture therapy for LBP in elderly patients.

Chronic LBP is a very common complaint in elderly patients. Acupuncture treatment has been used for pain relief for a long time. Several studies have examined the efficacy of acupuncture treatment for chronic LBP.16–19 As a consequence of the almost universal presence in the elderly of osteoarthrosis of the intervertebral joints and osteoporosis with collapse of the vertebral bodies, the muscles in the lumbar region and hip girdle are likely to have suffered stresses over a long period. Therefore, acupuncture treatment directed at the muscles has been advocated as an effective treatment of chronic LBP.

In a systematic review of acupuncture for LBP, Van Tulder et al included 11 clinical studies, eight of which compared acupuncture point stimulation with sham acupuncture.6 No significant differences were found between the two stimulation techniques. In evaluating the efficacy of acupuncture, three important parameters are the site, mode and intensity of the stimulation. 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 acupuncture points.16–19

Our results suggest that the response to deep needling of trigger points may be greater than the response to needling the traditional acupoint, at least three weeks after the start of treatment. These results suggest that the stimulation site is important, and the acupuncture stimulation of myofascial trigger points might be most effective on chronic LBP in elderly patients.

The trigger point as a treatment site for acupuncture
The myofascial trigger point has been defined as a highly localised and hyper-irritable spot in a taut band of skeletal muscle fibres.17 Important characteristics of a myofascial trigger point include tenderness, referred pain or referred tenderness, and a local twitch response.20

Acupuncture or dry needling of a myofascial trigger point appears to provide immediate relief of pain related to that myofascial trigger point. However, the most effective form of acupuncture for treating myofascial trigger points is still unclear.

In this study, clinical results suggested that deep stimulation has a better analgesic effect than superficial stimulation, although the difference was not statistically significant. The strength of stimulation may depend on different parameters such as manipulating procedure, size of needle and the depth of needle insertion. It seems self-evident that there would be differences in the effects of superficial and deep insertion because of the different tissues that are stimulated. Deep insertion of the needle affects several structures (skin, fascia, muscle), whereas superficial insertion affects only the skin.19,21

Myofascial trigger points are supposed to be sites where nociceptors, such as polymodal-type receptors, have been sensitised by various factors. In particular, sensitised nociceptors at the fascia might be possible candidates for the localised tenderness.22 The polymodal-type receptors are also proposed as possible candidates for acupuncture and moxibustion because they respond to chemical, thermal, and mechanical stimulation, all of which can generate an analgesic effect.23 These data suggest that acupuncture stimulation of myofascial trigger points in muscle may produce greater activation of sensitised polymodal-type receptors, resulting in stronger effects on pain relief. We should be aware of the fact that the polymodal receptors are distributed in the skin as well as the fascia and muscle, and should not exclude the possibility that superficial needling may activate polymodal receptors in the skin and produce analgesic effects.
Acknowledgments

The authors wish to thank Prof K Kawakita for his constructive comments on the manuscript, and H Ochi for assistance in this study. This study was supported by a grant from the Ministry of Health and Welfare (H14-Choju-029).

Summary points

The most effective form of acupuncture treatment for LBP is not known.

Many previous clinical studies have used standard acupuncture points.

This study in elderly patients showed a strong trend for deep needling at trigger points to be more effective than either shallow needling at trigger points or standard needling of standard points.

Reference list

Trigger point acupuncture treatment of chronic low back pain in elderly patients – a blinded RCT
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doi: 10.1136/aim.22.4.170

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