

# Treatment of low back pain by acupressure and physical therapy: randomised controlled trial

Lisa Li-Chen Hsieh, Chung-Hung Kuo, Liang Huei Lee, Amy Ming-Fang Yen, Kuo-Liong Chien, Tony Hsiu-Hsi Chen

Editorial by Frost and Stewart-Brown

Institute of Preventive Medicine, College of Public Health, National Taiwan University, Taipei, Taiwan  
 Lisa Li-Chen Hsieh  
*PhD student*  
 Amy Ming-Fang Yen  
*assistant professor*  
 Kuo-Liong Chien  
*associate professor*  
 Tony Hsiu-Hsi Chen  
*professor*

Hsin Kao Mei  
 Orthopedic Special Clinic, Kaohsiung, Taiwan  
 Chung-Hung Kuo  
*chief and orthopedist*  
 Kaohsiung Chang Gung Memorial Hospital, Kaohsiung, Taiwan  
 Liang Huei Lee  
*attending medical neurologist*

Correspondence to: Tony Hsiu-Hsi Chen  
 stony@episerv.cph.ntu.edu.tw

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## Abstract

**Objective** To evaluate the effectiveness of acupressure for treating low back pain in terms of disability, pain scores, and functional status.

**Design** Randomised controlled trial.

**Setting** Orthopaedic clinic in Kaohsiung, Taiwan.

**Participants** 129 patients with chronic low back pain.

**Intervention** Acupressure or physical therapy for one month.

**Main outcome measures** Self administered Chinese versions of standard outcome measures for low back pain (primary outcome: Roland and Morris disability questionnaire) at baseline, after treatment, and at six month follow-up.

**Results** The mean total Roland and Morris disability questionnaire score after treatment was significantly lower in the acupressure group than in the physical therapy group regardless of the difference in absolute score ( $-3.8$ , 95% confidence interval  $-5.7$  to  $-1.9$ ) or mean change from the baseline ( $-4.64$ ,  $-6.39$  to  $-2.89$ ). Acupressure conferred an 89% (95% confidence interval 61% to 97%) reduction in significant disability compared with physical therapy. The improvement in disability score in the acupressure group compared with the physical group remained at six month follow-up. Statistically significant differences also occurred between the two groups for all six domains of the core outcome, pain visual scale, and modified Oswestry disability questionnaire after treatment and at six month follow-up.

**Conclusions** Acupressure was effective in reducing low back pain in terms of disability, pain scores, and functional status. The benefit was sustained for six months.

## Introduction

Acupressure, a complementary and alternative therapy, is manipulated with the fingers on the acupoints. It has been used for relieving pain, illness, and injuries in traditional Chinese medicine.<sup>1</sup> The efficacy of acupressure in relieving pain associated with low back pain has been shown by a randomised controlled trial.<sup>2</sup> However, the outcomes were assessed by description of pain character and failed to take into account functional status and disability.<sup>3,4</sup> To establish a standard instrument for comparisons across studies, a standardised "core" set of questions and questionnaires has been proposed by an international programme on primary care management of low back pain since 1998.<sup>5</sup>

We aimed to do a randomised controlled trial using validated Chinese versions of the standard outcome measures to compare the efficacy of acupressure with that of physical therapy in alleviating low back pain

and to provide a base for comparison across international studies.

## Methods

**Study participants**—The study took place between 8 January and 12 May 2004, with follow-up at six months. We selected 188 participants from among the outpatients of a specialist orthopaedic clinic in Kaohsiung, Taiwan. Patients were eligible if they were aged 18 years and older and had had chronic low back pain for more than four months.

**Randomisation**—A research assistant independently randomised participants. After exclusion of ineligible patients, 129 (69%) patients aged between 18 and 81 were randomly allocated to two arms: 64 patients in the acupressure group and 65 patients in the physical therapy group.

**Interventions**—Participants received six sessions within one month. One senior acupressure therapist gave each session of acupressure treatment to ensure a uniform technique. Participants in the physical therapy group received routine physical therapy offered by the orthopaedic specialist clinic. Patients assessed the post-treatment pain scores and ratings by filling out the questionnaires or by telephone interview immediately after completing six treatment sessions, or the one month period, whichever came first.

**Blinding**—Both the acupressure therapist and the physical therapists were blind to pretreatment assessment. The research assistant who did the post-treatment and six month follow-up interviews by telephone was also blind to pretreatment assessment and to intervention as far as possible. The assessor was blind to intervention group before analysis of data was complete.

**Outcome measurements**—We used three of the four Chinese versions of the standard outcome measures (core outcome measures, Roland and Morris disability questionnaire, Oswestry disability questionnaire) and a visual analogue scale for recording pain scores. Participants provided baseline information and completed the Chinese version of the standard outcome measures at enrolment. We divided the total scores measured by the Roland and Morris disability questionnaire into two score scales, taking 0-12 as minimal disability and 13-24 as significant disability. We used the modified version of the Oswestry disability questionnaire used in the American Academy of Orthopaedic Surgeons lumbar cluster. We divided the total scores into five grades, taking 0-11 as minimal disability, 12-22 as moderate disability, 23-32 as severe disability, 33-43 as crippled, and  $\geq 44$  as bed bound.



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*Statistical analysis*—Analysis was by intention to treat. We compared baseline variables and between group difference in scores on the visual analogue scale, core outcome measures, Oswestry disability questionnaire, and Roland and Morris disability questionnaire, with adjustment for pretreatment score. We used regression models to estimate the odds ratios of having significant disability as measured by the Oswestry disability questionnaire and Roland and Morris disability questionnaire, with adjustment for pretreatment score.

## Results

No differences existed at baseline in demographic, educational, or occupational aspects of the two treatment groups.

### Roland and Morris disability questionnaire

The mean total Roland and Morris disability questionnaire score after treatment was significantly lower in the acupuncture group than in the physical therapy group, regardless of the difference in absolute score (−3.8, 95% confidence interval −5.7 to −1.9) or mean change from baseline (−4.64, −6.39 to −2.89) (table 1). Acupuncture conferred an 89% (95% confidence interval 61% to 97%) reduction in significant disability compared with physical therapy after adjustment for degree of disability at baseline. The mean difference in total score between the two groups after treatment remained statistically significant (P<0.05) after adjustment for pretreatment score or disability together with other baseline characteristics. The improvement in Roland and Morris disability questionnaire score in the acupuncture group compared with the physical therapy group remained at six months' follow-up. The number needed to treat with acupuncture was 9.31.

### Core outcome measures and visual analogue scale

After adjustment for pretreatment score (comparison 1 in table 2), the differences in mean scores for core

**Table 1** Roland and Morris disability questionnaire (RMDQ) scores pretreatment, post-treatment, and at six month follow-up

| Sums of RMDQ scores/<br>ordinal scorings (0-24) | Acupuncture<br>(n=64) | Physical<br>therapy (n=65) | Comparison 1†               | Comparison 2‡                |
|---|-----------------------|----------------------------|-----------------------------|------------------------------|
| <b>Pretreatment</b>                             |                       |                            |                             |                              |
| Mean (SD) total score                           | 10.9 (6.2)            | 10.0 (5.3)                 | —                           | —                            |
| Degree of disability (No):                      |                       |                            |                             |                              |
| Minimal (0-12)                                  | 36                    | 45                         | —                           | —                            |
| Significant (13-24)                             | 28                    | 20                         | —                           | —                            |
| <b>Post-treatment</b>                           |                       |                            |                             |                              |
| Mean (SD) total score                           | 5.4 (5.0)             | 9.2 (5.8)                  | −3.8***<br>(−5.7 to −1.9)   | −4.64***<br>(−6.39 to −2.89) |
| Degree of disability (No):                      |                       |                            |                             |                              |
| Minimal (0-12)                                  | 56                    | 46                         | OR=0.11**<br>(0.03 to 0.39) | —                            |
| Significant (13-24)                             | 8                     | 19                         | —                           | —                            |
| <b>Six month follow-up</b>                      |                       |                            |                             |                              |
| Mean (SD) total score                           | 2.2 (3.2)             | 6.7 (5.5)                  | −4.5***<br>(−6.1 to −2.9)   | −5.36***<br>(−7.21 to −3.52) |
| Degree of disability (No):                      |                       |                            |                             |                              |
| Minimal (0-12)                                  | 63                    | 57                         | OR=0.07*<br>(0.01 to 0.57)  | —                            |
| Significant (13-24)                             | 1                     | 8                          | —                           | —                            |

†Absolute difference between groups analysed by Wilcoxon rank sum test for total scores, 95% confidence interval calculated by non-parametric jack-knife method; odds ratio (OR) (95% confidence interval) of showing significant degree of disability for acupuncture compared with physical therapy, analysed by multiple logistic regression.

‡Difference (95% confidence interval) in mean change in score from baseline.

\*P<0.05.

\*\*P<0.01.

\*\*\*P<0.0001.

outcome measures in the acupuncture group were significantly lower than those in the physical therapy group for “low back pain,” “leg pain,” “pain interferes with normal work,” “days cut down on doing things,” and “days off from work/school.” The mean scores for the pain visual scale were lower in the acupuncture group than in the physical therapy group. The differences between the two groups remained statistically significant (P<0.05) after adjustment for pretreatment score and other baseline characteristics. In terms of mean change from baseline, the benefit was also greater in the acupuncture group for all variables

**Table 2** Mean (SD) core outcome measures pretreatment, post-treatment, and at six month follow-up

| Core outcome measures<br>and related indicators | Pretreatment          |                               | Post-treatment        |                               |                                 |                                | Six month follow-up   |                               |                                 |                                |
|---|-----------------------|-------------------------------|-----------------------|-------------------------------|---------------------------------|--------------------------------|-----------------------|-------------------------------|---------------------------------|--------------------------------|
|   | Acupuncture<br>(n=64) | Physical<br>therapy<br>(n=65) | Acupuncture<br>(n=64) | Physical<br>therapy<br>(n=65) | Comparison 1†                   | Comparison 2‡                  | Acupuncture<br>(n=64) | Physical<br>therapy<br>(n=65) | Comparison 1†                   | Comparison 2‡                  |
| Degree of “how bothersome”:                     |                       |                               |                       |                               |                                 |                                |                       |                               |                                 |                                |
| Low back pain                                   | 2.97 (1.01)           | 2.78 (0.96)                   | 2.11 (0.86)           | 2.57 (0.83)                   | −0.53***<br>(−0.80 to −0.28)    | −0.64***<br>(−0.97 to −0.32)   | 1.59 (0.73)           | 2.17 (0.89)                   | −0.62***<br>(−0.90 to −0.35)    | −0.76***<br>(−1.13 to −0.39)   |
| Leg pain  | 2.78 (1.16)           | 2.74 (1.11)                   | 1.94 (0.85)           | 2.52 (0.97)                   | −0.60***<br>(−0.87 to −0.34)    | −0.63**<br>(−0.97 to −0.29)    | 1.48 (0.71)           | 2.15 (0.97)                   | −0.68***<br>(−0.96 to −0.41)    | −0.71**<br>(−1.10 to −0.32)    |
| Pain interferes with normal work                | 2.78 (1.11)           | 2.45 (0.98)                   | 2.05 (0.88)           | 2.38 (1.01)                   | −0.50**<br>(−0.78 to −0.21)     | −0.67**<br>(−1.02 to −0.33)    | 1.61 (0.75)           | 2.23 (0.88)                   | −0.70***<br>(−0.98 to −0.42)    | −0.96***<br>(−1.35 to −0.57)   |
| Satisfaction of life with symptoms              | 1.39 (0.68)           | 1.57 (0.66)                   | 2.38 (1.27)           | 1.97 (1.04)                   | 0.46*<br>(0.05 to 0.86)         | 0.58**<br>(0.15 to 1.02)       | 3.63 (1.16)           | 2.95 (1.24)                   | 0.69**<br>(0.27 to 1.11)        | 0.85**<br>(0.38 to 1.32)       |
| Days cut down on doing things                   | 5.0 (10.5)            | 3.4 (8.6)                     | 1.6 (4.7)             | 4.0 (9.8)                     | −3.16**<br>(−5.38 to −0.93)     | −3.99**<br>(−6.83 to −1.15)    | 0.4 (2.6)             | 2.6 (8.0)                     | −2.48*<br>(−4.45 to −0.50)      | −3.70*<br>(−6.98 to −0.42)     |
| Days off from work/school                       | 4.2 (9.5)             | 3.3 (8.6)                     | 1.5 (5.4)             | 3.5 (9.3)                     | −2.45*<br>(−4.59 to −0.31)      | −2.87*<br>(−5.51 to −0.23)     | 0.6 (3.8)             | 2.5 (8.0)                     | −2.15*<br>(−4.22 to −0.09)      | −2.79<br>(−5.94 to −0.35)      |
| Satisfaction with previous treatment            | 2.06 (1.39)           | 2.13 (1.68)                   | 4.12 (1.22)           | 3.06 (1.38)                   | 1.25***<br>(0.82 to 1.68)       | 1.68***<br>(1.17 to 2.20)      | 4.39 (0.75)           | 3.15 (1.14)                   | 1.39***<br>(1.02 to 1.76)       | 1.83***<br>(1.37 to 2.29)      |
| Pain visual scale (0 to 100)                    | 58.8 (17.88)          | 57 (17.83)                    | 30.6 (21.75)          | 48.0 (23.4)                   | −18.38***<br>(−25.60 to −11.17) | −19.27***<br>(−27.04 to −11.5) | 16.1 (17.4)           | 41.4 (24.6)                   | −25.92***<br>(−33.06 to −18.77) | −27.12***<br>(−35.3 to −18.94) |
| Sleeping with low back pain                     | 2.17 (0.86)           | 2.03 (0.97)                   | 1.44 (0.59)           | 1.85 (0.85)                   | −0.46***<br>(−0.69 to −0.24)    | −0.55**<br>(−0.84 to −0.26)    | 1.16 (0.44)           | 1.72 (0.84)                   | −0.61***<br>(−0.82 to −0.39)    | −0.71***<br>(−1.02 to −0.39)   |

†Absolute difference (95% confidence interval) between groups by analysis of covariance.

‡Difference (95% confidence interval) in mean change in core outcome measures from baseline.

\*P<0.05.

\*\*P<0.01.

\*\*\*P<0.0001.

(comparison 2 in table 2). The statistically significant improvement remained or even increased at the six month follow-up.

#### Modified Oswestry disability questionnaire

The mean total Oswestry disability questionnaire score after treatment was significantly lower in the acupuncture group than in the physical therapy group, regardless of the difference in absolute score ( $-5.34$ ,  $-7.62$  to  $-3.05$ ) or mean change from baseline ( $-6.81$ ,  $-9.49$  to  $-4.12$ ). The odds ratio of increasing one grade of disability was 0.22 (0.11 to 0.48;  $P=0.0001$ ) for the acupuncture group. The differences between the two groups remained significant ( $P<0.05$ ) after adjustment for pretreatment score or disability in conjunction with other baseline characteristics (see [bmj.com](http://bmj.com)). The improvement in Oswestry disability questionnaire score in the acupuncture group compared with the physical group remained at the six month follow-up. The number needed to treat with acupuncture was 4.58.

#### Discussion

This study shows that acupuncture is more efficacious in alleviating low back pain than is physical therapy, as measured by pain visual analogue scale, core outcome measures, Roland and Morris disability questionnaire, and Oswestry disability questionnaire. The results support the conclusion of the previous randomised controlled clinical trial on low back pain treated by acupuncture.<sup>2</sup>

#### Outcome measures used

Most of the domains of the core outcome measures were able to distinguish the difference between the acupuncture group and the physical therapy group, irrespective of absolute change or mean change from baseline at post-treatment and six month follow-up assessments. With both the Roland and Morris disability questionnaire and the Oswestry disability questionnaire we saw statistically significant treatment differences, irrespective of whether the score was summed or classified into five ordinal categories.<sup>6</sup>

#### Limitations of the study

The efficacy of acupuncture in pain relief might be attributed to a psychological effect emerging between patients and therapist during therapy. However, we believe that such a confounding effect caused by interaction or a doctor-patient relationship is unlikely to affect the results, because people who seek physical therapy generally have a strong desire for orthodox/Western medicine, and the therapists in both groups were blind to the results of pretreatment assessments. In addition, we used the Roland and Morris disability questionnaire and Oswestry disability questionnaire to assess functional status and disability, which should be less affected by a psychological effect than subjective measures of pain.

Twenty (15.5%) patients were lost to follow-up at six months. However, we substituted missing data for patients lost to follow-up with baseline or post-treatment data by assuming no change since last contact.

The effectiveness of any manipulation therapy is highly dependent on the therapist's technique and experience. The selection of treatment modality and

#### What is already known on this topic

Acupuncture reduces low back pain

Little is known about its efficacy in reducing low back pain assessed with standard outcome measures

#### What this study adds

Acupuncture was effective in reducing low back pain in terms of pain scores, functional status, and disability

The effect was not only seen in the short term but lasted for six months

technique to be applied to patients depended on the discretion of the therapist for both physical therapy and acupuncture. For physical therapy, this should not be a serious problem because the technique has been well established in orthodox/Western medicine. We avoided variation across practitioners for acupuncture by using only one therapist.

#### Conclusions

This randomised controlled clinical trial has shown the efficacy of acupuncture compared with physical therapy in pain relief for patients with low back pain in terms of disability, pain scores, and functional status. The results provide a base for comparison across international studies.

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#### Endpiece

#### Einstein on truth

One who doesn't take truth seriously in small matters cannot be trusted in large ones either.

Albert Einstein

Rajesh K Choudhary, staff grade surgeon,  
Darlington