

CLINICAL OBSERVATION

Therapeutic evaluation of lumbar tender point deep massage for chronic non-specific low back pain

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was 1.5 ± 0.8 and 1.1 ± 0.7 ; the muscle hardness difference was 4.2 ± 1.6 and 3.5 ± 1.3 ; and the VAS score difference was 1.9 ± 0.9 and 1.4 ± 0.8 . Compared to the control group, the treatment group had higher pressure pain threshold ($t=2.09, P<0.05$), and lower muscle hardness ($t=2.05, P<0.05$) and pain intensity ($t=2.46, P<0.05$).

CONCLUSION: Lumbar tender point deep tissue massage combined with lumbar traction produced better improvement in pressure pain threshold, muscle hardness and pain intensity in patients with chronic non-specific low back pain than with lumbar traction alone.

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Key words: Low back pain; Tender point; Deep tissue massage; Therapeutic evaluation; Pressure pain threshold; Muscle hardness

Abstract

OBJECTIVE: To observe the therapeutic effect of lumbar tender point deep tissue massage plus lumbar traction on chronic non-specific low back pain using change in pressure pain threshold, muscle hardness and pain intensity as indices.

METHODS: We randomly divided 64 patients into a treatment group (32 cases) and a control group (32 cases). Two drop-outs occurred in each group. Patients in the treatment group received tender point deep tissue massage plus lumbar traction and patients in the control group received lumbar traction, alone. We used a tissue hardness meter/allogometer and visual analog scale (VAS) to assess the pressure pain threshold, muscle hardness and pain intensity.

RESULTS: Following treatment, we obtained the following results in the treatment and control groups, respectively: the pressure pain threshold difference

INTRODUCTION

Chronic non-specific low back pain is a major health problem in modern society,¹ and common in some athletes. The condition has a high prevalence in many countries around the world¹ and is usually accompanied by local tender points in the low back which are a major source of chronic non-specific low back pain,² presenting as local muscle spasm and stiffness.³ Transverse muscle stiffness has been termed "hardness"⁴ and is associated with muscle hyperalgesia.⁵ Therefore, change of pressure pain threshold and muscle hardness in the low back are useful for the evaluation of the therapeutic effect of treatments for chronic non-specific low back pain. In this study, we used muscle hardness as an index for efficacy for tender point deep tissue

massage in combination with lumbar traction for chronic non-specific low back pain compared with lumbar traction, alone.

METHODS

General materials

We used a prospective, small sample, randomized controlled experimental design. Sixty-four outpatients (34 males and 30 females) from the rehabilitation medicine center of Chinese PLA General Hospital were included in this study and all patients gave informed consent.

Randomization

Random numbers were generated using Microsoft Office Excel, with a single designated person responsible for the allocation table. Using the treatment sequence, 32 subjects were assigned to the treatment group and 32 subjects were assigned to the control group.

Inclusion criteria

Non-specific low back pain is defined as pain under the scapulas, above the cleft of the buttocks, with or without radiation to the lower extremities.⁶ Patients met the following criteria: non-specific low back pain lasting more than 3 months and an age of 21 to 75 years. Patient evaluation included conventional radiograph, CT scan, or MRI of the lumbar spine, as well as physical examination.

Exclusion criteria

We excluded patients with language barriers and those with low back pain caused by neoplasm, osteoporosis, vertebral fracture, rheumatoid arthritis, acute herniated disc accompanied by nerve root entrapment, and unstable spondylolisthesis.

*Tender point determination*⁷

We used the following protocol to determine tender points: 1) Ask the patient to point with 1 finger to the point of most intense pain. 2) Palpate the area using 1 finger, to find the point of maximum tenderness. 3) Press the point of maximum tenderness and ask the patient "Is this the site of your pain?" If the patient confirmed this point as the cause of the pain, it was considered local pain. If, however, perpendicular compression of the maximum tender point induced pain in a distant area, it was considered referred pain.

Tender point deep massage plus lumbar traction in the treatment group

With the patient prone on the examination bed and with both forearms at the side, we applied deep massage to the tender point and peripheral taut band. The technique of deep slide massage uses the doctor's body weight to apply gradually increasing gentle pressure

through the thumb. Deep slide massage is applied until 8-10 s after the patient begins to feel slight discomfort. This sequence was repeated four to five times for maximum tenderness at the point and the taut band. Treatment was performed twice per week, at the same time, combined with intermittent lumbar traction (Model OL-2000, made in OG Giken Co., Ltd.) once daily. The traction force was set between 40%-50% body weight (kg) and traction time was 20 min. The treatment course was 3 weeks.

Lumbar traction treatment in the control group

Pressure pain point determination and lumbar intermittent traction were the same as for the treatment group. The treatment course was also 3 weeks.

Criteria for therapeutic effect

We used a combination tissue hardness meter/algometer to measure pressure pain threshold and muscle hardness of the tender point (Model OE-220, made in Ito ultrashort wave corporation of Japan) and a visual analog scale (VAS) to measure the pain intensity. The therapeutic effect was evaluated by change in: the pressure pain threshold; muscle hardness; and VAS score after treatment in the two groups.

We measured pressure pain threshold using the tissue hardness meter/algometer by placing the 1 cm diameter plastic tip perpendicularly on the painful pressure point indicated by the patient. The compression pressure was gradually increased at a speed of approximately 1 kg/s. The patient pushed a button linked to the algometer in his or her hand as soon as he or she began to feel pain. The patient was asked to remember this level of pain and apply the same criterion to the next measure. The average value of 3 readings was used for data analysis.

We measured muscle hardness using the tissue hardness meter/algometer by placing the 10 cm diameter plastic disc perpendicularly on the examined painful pressure point. The tissue hardness meter/algometer automatically recorded the muscle hardness value after slow pressure. The average value of 3 readings was used for data analysis.

Pain intensity measurement was performed using a 100 mm visual analogue scale.

Statistical methods

All analyses were performed using SPSS software for Windows 13.0 (SPSS, Chicago, IL, USA). Measurements were expressed as mean \pm standard deviation ($\bar{x} \pm s$). The independent samples t-test was used between the two groups for measurements before and after treatment. A *P* value less than 0.05 was considered statistically significant.

RESULTS

Baseline data

The treatment group included 32 subjects, 18 males and 14 females, with age ranging from 21 to 70 years

(43 ± 15) and a course of disease ranging from 4.0 months to 6.0 years (2.7 ± 1.1). The control group included 32 subjects, 16 males and 16 females, with age ranging from 18 to 72 years (42 ± 15) and a course of disease ranging from 5.0 months to 7 years (2.6 ± 1.4).

There were no significant differences ($P > 0.05$) in the age range or the course of disease. There were four drop-out cases in this study, two in each group, and a total of 60 patients completed this study. Figure 1 shows the flow diagram for this randomized trial.

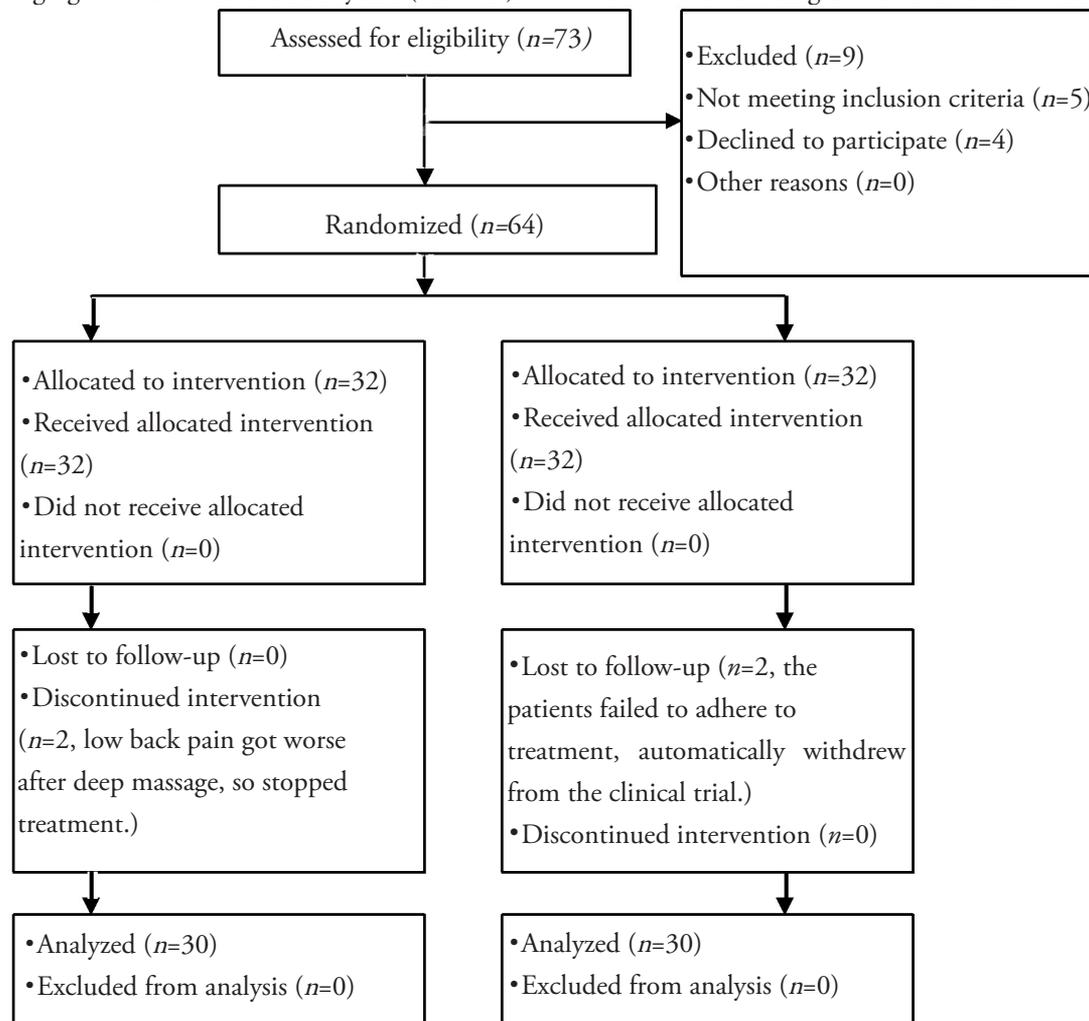


Figure 1 Flow diagram

Comparison of pressure pain threshold between the two groups

As shown in Table 1, before treatment there was no difference in pressure pain threshold ($P > 0.05$) between the two groups, indicating their comparability. After treatment, the pressure pain threshold difference in the treatment group was markedly higher than in the control group ($P < 0.05$).

Comparison of muscle hardness between the two groups

Table 2 shows that there was no difference before treatment in muscle hardness ($P > 0.05$) between the two groups, indicating their comparability. After treatment, the muscle hardness difference in the treatment group was markedly lower than in the control group ($P < 0.05$).

Comparison of VAS score between the two groups

As shown in Table 3, there was no difference in VAS score before treatment ($P > 0.05$) between the two

groups, indicating their comparability. After treatment, the VAS score difference was statistically different between the two groups ($P < 0.05$).

DISCUSSION

The main goal of chronic non-specific low back pain treatment is to relieve pain and tension in the involved muscles. Tender point deep tissue massage is a frequently used treatment for chronic non-specific low back pain. Previous studies demonstrated that tender point deep massage had a better therapeutic effect in chronic soft tissue injury pain,^{8,9} but lacked an objective and quantitative evaluation method. In these studies, patients with chronic non-specific low back pain showed less relaxation of the lumbar muscles¹⁰ and lower pain threshold.¹¹ Change in pain threshold and muscle hardness should be a relatively objective method, then, to evaluate the therapeutic effect of tender point deep tissue massage and is why we selected change in pain

Table 1 Comparison of pressure pain threshold between the two groups (kg/cm², $\bar{x} \pm s$)

Group	n	Before treatment	After treatment	Difference
Treatment group	30	3.8±0.6 ^a	5.3±0.8	1.5±0.8 ^b
Control group	30	3.7±0.6 ^a	4.7±0.8	1.1±0.7 ^b

Notes: ^at=0.65, P> 0.05; ^bt=2.09, P<0.05.

Table 2 Comparison of muscle hardness between the two groups (N/cm², $\bar{x} \pm s$)

Group	n	Before treatment	After treatment	Difference
Treatment group	30	37.7±9.9 ^a	33.4±10.2	4.2±1.6 ^b
Control group	30	42.5±11.2 ^a	39.1±11.2	3.5±1.3 ^b

Notes: ^at=1.76, P> 0.05; ^bt=2.05, P<0.05.

Table 3 Comparison of VAS score between the two groups ($\bar{x} \pm s$)

Group	n	Before treatment	After treatment	Difference
Treatment group	30	6.7±1.6 ^a	4.9±1.3	1.9±0.9 ^b
Control group	30	6.9±1.6 ^a	5.9±1.3	1.4±0.8 ^b

Notes: ^at=0.40, P>0.05; ^bt=2.46, P<0.05.

threshold and muscle hardness as our outcome measures. We found a statistically significant (P<0.05) increase in pressure pain threshold, decreased muscle hardness and lower VAS score after treatment in the treatment group compared to the control group in this study, suggesting improved therapeutic efficiency from the application of tender point deep tissue massage in combination with lumbar traction than with lumbar traction alone. This study shows that tender point deep tissue massage in combination with lumbar traction can increase local paraspinal pressure pain threshold and decrease muscle hardness level, while also lowering pain intensity and demonstrates that pain intensity may be related to pressure pain threshold and muscle hardness. Possible mechanisms include that this therapy: is able to release and stretch the spasmodic muscle tissue; separate muscle fibers; broaden muscle tissue; disrupt local soft tissue adhesions; accelerate local venous and lymphatic circulation; increase arterial blood flow; promote metabolic waste removal and enhance the delivery of oxygenated blood; decrease neuromuscular excitability; and relax muscle. Therefore, the quantitative measurement of local muscle tissue pressure pain threshold and hardness can provide relatively objective indices for therapeutic assessment of chronic non-specific low back pain.

Our study was limited by the small sample size. Future trials with larger sample sizes and long-term observation may obtain more reliable results.

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