Effectiveness and clinical benefit of a therapy of combined non-pharmaceutical Traditional Chinese Medicine for knee osteoarthritis: a randomized controlled study

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Abstract

OBJECTIVE: To evaluate the effectiveness and clinical benefit of a combined non-pharmaceutical Traditional Chinese Medicine (TCM) therapy for patients with knee osteoarthritis (KOA).

METHODS: A total of 60 patients with KOA were randomized into three groups (n = 20 each): the drug group was treated with standard pharmacotherapy, the treatment group was treated with a combination of electro-acupuncture (EA), needle warming moxibustion (NWM), and Teding Dianci Pu (TDP) therapies, and the combined group was treated with standard pharmacotherapy plus EA, NWM, and TDP therapies.

RESULTS: The primary outcome measurements were pain visual analog scale (VAS) scores and Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) total and subscale scores. The secondary outcome measurement was score on the Assessment of Quality of Life instrument version of the 36-item Short Form Health Survey (AQoL-SF36). After 1 week of treatment, the VAS pain, amount of pain (WOMAC), and total WOMAC scores in the treatment and combined groups were significantly improved compared with both baseline and the drug group (in treatment group, \( P = 0.012, 0.027 \), in combined group, \( P = 0.037, 0.005 \), \( P < 0.05 \)). After 2 weeks of treatment, these indicators maintained the same trend, and scores of the AQoL-SF36 emotional wellbeing domain increased significantly in the treatment group compared with its baseline and drug group (\( P = 0.041, 0.017, P < 0.05 \)). Furthermore, the stiffness, general health, and emotional wellbeing domain scores in the treatment and combined groups were significantly improved compared with baseline and with the drug group (\( P < 0.05 \)), whereas no significant differences were observed between the treatment and the combined groups.

CONCLUSION: The combination of non-pharmaceutical EA, NWM, and TDP therapies showed similar effectiveness with and without concomitant standard pharmacotherapy and may enhance emotional wellbeing in patients with KOA.

Keywords: Osteoarthritis, knee; Electroacupuncture; Pain measurement; Needle warming moxibustion; Teding Dianci Pu therapy; Randomized controlled trial

INTRODUCTION

Knee osteoarthritis (KOA) is a chronic condition with multiple causes and can lead to joint degeneration, articular cartilage damage, and para-knee articular soft tissue degeneration. Patients with KOA may suffer from joint pain, swelling, deformity, dysfunction, and other symptoms, but the primary clinical manifestations are pain and joint stiffness. In clinical practice, the management of KOA primarily focuses on treating pain and disability using non-pharmacological therapies and alternative therapies, including Traditional Chinese Medicine (TCM), as there are no effective medications currently available. Among these non-pharmacological approaches, the use of acupuncture has increased in recent decades, and the results from a series of randomized controlled clinical trials have indicated that electro-acupuncture (EA) is an effective therapy for treating various painful diseases such as KOA. Other reports have described the use of needle warming moxibustion (NWM), a method of stimulating acupuncture points by needle penetration followed by the burning of a piece of moxa (moxibustion) attached to the needle. This approach is frequently used in the treatment of painful conditions such as arthritis, sciatica, cervical spondylopathy, intervertebral disk herniation, and osteoarthritis. It is generally believed that heat from moxibustion is transmitted to the acupoint by radiation as well as by direct conduction via the shaft of the needle, thereby stimulating deep tissue within the acupoint and warming the acupoint at the surface. Teding Dianci Pu (TDP) therapy is a novel technology that has emerged in recent years and is used to treat chronic inflammatory pain. TDP has anti-inflammatory and analgesic functions and can enhance the secretion of endorphins, increase blood circulation, improve microcirculation, and promote self-regulation mechanisms. Its effects are primarily mediated via thermal effects, resonance energy absorption effects, microelement regulation effects, and other biological effects; it improves local blood circulation in joints and thus relieves inflammation. Several previous clinical trials have evaluated the efficacy of acupuncture, EA, NWM, and TDP, although the results are inconclusive owing to a lack of robust evidence for the efficacy of these treatments. For example, some studies indicate the clear benefits of acupuncture, whereas others are less conclusive, highlighting the need to clarify the clinical efficacy of EA, NWM, and TDP or combinations of these therapies. In the present study, we aimed to evaluate the effectiveness and clinical advantages of a therapy of combined non-pharmaceutical TCM for patients with KOA.

MATERIALS AND METHODS

Study design
This single-blinded (assessor and patient) study was designed to assess the efficacy of different therapies in patients with KOA. A randomized, controlled, three-arm trial was used to compare two control groups (drug group and combined group) with a treatment group. The study was conducted at the First Affiliated Hospital of Henan University of Science and Technology. All patients recruited were divided into three parallel groups (n = 20 per group): the drug group, the treatment group, and the combined group. Patients with pain in one knee and those with pain in both knees were included without discrimination. Each patient was asked to provide informed consent. The study was conducted in accordance with the Declaration of Helsinki and was approved by the ethics committees of the relevant local communities. All the KOA patients participating in this study are required to sign a patient informed consent and comply with the requirements set out in this document. We requested that patients avoid physical therapy as much as possible to ensure that our results reflected the effect of acupuncture, EA, NWM, and TDP therapies, rather than other forms of treatment. Patients were questioned at each visit about any medication received and this information was recorded for analysis. After providing informed consent and being randomized, patients in the three groups received their respective treatments for a period of 2 weeks. Each treatment session lasted 30 min. Patients were asked to undergo assessments at baseline, at the end of the 1st week, and at the end of the 2nd week of the treatment phase. Assessment time points and groups are shown in Figure 1.

It must be emphasized that, to maintain blinding in this clinical trial, the patients, statisticians, and individuals who evaluated the statistical data and outcomes were blind to the treatment allocation. However, blinding was not used for acupuncturists in the implementation of EA, NWM, and TDP, as it was not feasible to conceal allocation from them.

Inclusion criteria
The inclusion criteria were as follows: (a) male or female, aged at least 45 years, with KOA diagnosed according to the American College of Rheumatology criteria, including radiographic evidence of at least one osteophyte at the tibiofibemoral joint in one or both knees (Kellgren-Lawrence score 2 or 3); (b) pain score of at least 3 points on a 10-point visual analog scale (VAS) for most days during the previous month; and (c) willingness to sign the consent form and be randomly assigned to either a treatment or a placebo group. All the patient characteristics are shown in Table 1.

Exclusion criteria
The exclusion criteria were as follows: (a) patient has had an adverse reaction to acupuncture or is unwilling to accept acupuncture treatment; (b) patient conforms to the inclusion criteria, but does not follow prescribed treatment, which decreases the curative effects of EA so
that it cannot be judged, or patient has incomplete information that may interfere with his/her ability to accurately judge the effects of his/her treatment; (c) patient has accompanying severe cardiovascular, cerebral, hepatic, renal, or hemopoietic diseases; (d) patient has inflammatory arthritis such as rheumatoid arthritis or gouty arthritis, or other diseases that may affect the condition of the knees; (e) patient is pregnant, attempting to become pregnant, or lactating; and (f) patient has a mental disease.

**Interventions**

Drug group: patients in the drug group received diclofenac sodium enteric-coated tablets (Beijing novartis pharmaceutical co. Ltd., Beijing, China) and medication for activating blood circulation (Jilin Zixin Pharmaceutical Industrial Co., Ltd., Jilin, China) and underwent once-weekly articular cavity injection therapy using sodium hyaluronate (Shandong Ph.d. lun fulida pharmaceutical Co. Ltd., Shandong, China)

Treatment group: patients in the treatment group underwent EA, NWM, and TDP therapy for 30 min per day. The acupoints selected in the study and the combined non-pharmaceutical treatment site are illustrated in Figure 2.

**Figure 1** Trial flow chart

VAS: visual analog scale; WOMAC: Western Ontario and McMaster Universities; AQoL-SF36: Assessment of Quality of Life instrument version of the 36-item Short Form Health Survey.

**Table 1** Patient characteristics ( mean ± s )

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Total sample ( n = 60 )</th>
<th>Drug group ( n = 20 )</th>
<th>Treatment group ( n = 20 )</th>
<th>Combined group ( n = 20 )</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender male/female ( n )</td>
<td>34/26</td>
<td>12/8</td>
<td>10/10</td>
<td>9/11</td>
<td>0.551</td>
</tr>
<tr>
<td>Age (years)</td>
<td>52.2±3.6</td>
<td>45.2±7.1</td>
<td>54.1±6.4</td>
<td>51.5±6.0</td>
<td>0.414</td>
</tr>
<tr>
<td>Kellgren-Lawrence (grade II / III )</td>
<td>35/25</td>
<td>10/10</td>
<td>13/7</td>
<td>12/8</td>
<td>0.628</td>
</tr>
<tr>
<td>One knee/both knees</td>
<td>29/31</td>
<td>8/12</td>
<td>10/10</td>
<td>11/9</td>
<td>0.304</td>
</tr>
<tr>
<td>Duration of pain (years)</td>
<td>11.2±1.8</td>
<td>9.7±1.9</td>
<td>12.4±3.2</td>
<td>10.9±1.2</td>
<td>0.252</td>
</tr>
</tbody>
</table>

Notes: drug group: treated using diclofenac sodium enteric-coated tablets, drugs to activate blood circulation, and sodium hyaluronate; treatment group: treated with a combination of EA, NWM, and TDP therapies; combined group: treated with a combination of usual medications, EA, NWM, and TDP therapies. EA: electro-acupuncture; NWM: needle warming moxibustion; TDP: Teding Dianci Pu.

The 2 test was used for statistical analysis, P < 0.05 vs baseline, n = 20 per group; "The Wilcoxon rank sum test was used for statistical analysis, P < 0.05 vs drug group, n = 20 per group."
(ST 35), Zusanli (ST 36), Yinlingquan (SP 9), Qusquan (LV 8), Liangqiu (ST 34), Xuehai (SP 10), and the Ashi point (pain point) using sterile, disposable Hwato needles (Suzhou, China). Patients were positioned on a bed, supported by two pillows under the knees, and instructed to assume a comfortable position with no movement during the 30-min stimulation period. Following disinfection of the local area, 30-gauge needles with an outer diameter of 0.3 mm and length of 40 mm were vertically inserted to a depth of 25-40 mm. Using lifting and thrusting combined with twirling and rotating of the needles, a De Qi sensation (feeling of fullness, numbness, heaviness, soreness, or dull ache) was achieved. Next, a direct current and dilatation and rotation of the needles, a De Qi sensation (feeling of fullness, numbness, heaviness, soreness, or dull ache) was achieved. The distance from the bottom of the moxa block to the junction of the handle and needle shaft was approximately 10 mm. In several earlier cases, commercially available moxa cylinders (12 mm × 15 mm; WuShe, Shuzhou, China) were used but were discontinued because their effective heating time on the skin surface was too short; specifically, skin temperature during burning of the moxa cylinder was > 40 °C for less than 30 s when the cylinder was 10 mm above the skin. In other cases, a thin piece of cardboard (approximately 50 mm × 40 mm × 0.2 mm) was placed above the skin to mimic clinical practice procedures that aim to prevent potential burn injury caused by falling moxa ash. In the present study, the moxa was ignited at the top in all cases.

TDP therapy: during EA and NWM treatment, the TDP instrument heating element was directed at the painful area of the knee joint and irradiation was performed for 30 min. The intensity of TDP was adjusted according to the amount of redness of the skin of the knee.

Combined group: patients in the combined group received the same treatment as those in the drug group, as well as the same treatment as patients in the treatment group (EA, NWM, and TDP).

**Primary outcome measurements**

The primary outcome measurements were scores on the VAS and the Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC). The VAS is an internationally recognized pain scale. It is a 100-mm line ranging from 0 (no pain) to 10 (pain as bad as it could be). The efficacy of the treatment in each group was assessed using WOMAC scores at baseline, the end of the 1st week of treatment, and the end of the 2nd week of treatment. The WOMAC is a widely used, reliable, valid, and responsive measure of treatment outcomes in patients with KOA of the hip or knee. It consists of 24 questions (5 related to the amount of pain, 2 to stiffness, and 17 to physical function), and takes less than 5 min to complete. The WOMAC (Standard edition) used here rates each question on an ordinal scale of 0 to 10; lower scores indicate lower levels of symptoms or physical disability.

**Secondary outcome measurement**

Health-related quality of life was measured using the Assessment of Quality of Life instrument version of the 36-item Short Form Health Survey (AQoL-SF36). Pain, whether acute or chronic, can affect a patient’s emotions. The AQoL-SF36 has strong psychometric properties and is more responsive than other more widely used scales. The AQoL-SF36 is a self-administered questionnaire designed to measure patient outcomes in medical practice and clinical research and to evaluate the effectiveness of health interventions. The 36 questions in the AQoL-SF36 measure an individual’s perceived health across eight domains: physical functioning; role limitations due to physical health; role limitations due to emotional problems; energy/fatigue; emotional wellbeing; social functioning; pain; and general health. Higher scores indicate better functioning.

**Data analysis**

All analyses were conducted using SPSS version 13.0 (SPSS Inc., Released 2005, SPSS Statistics for Windows, Version 13.0, Chicago, IL, USA). Normally distributed data were presented as mean ± standard deviation (x ± s). The χ² test or Wilcoxon rank sum test were used to compare baseline characteristics of the patients receiving EA therapy were permitted to receive pharmacological treatment for their condition as needed.

NWM therapy: during EA therapy, the Neixiyan (EX-LE 5) and Dubi (ST 35) acupoints were also used for NWM therapy (Figure 2). Specifically, a 15-mm moxa cylinder block weighing (1.60 ± 0.05) g was prepared from a moxa stick (Yilejia Pure Moxa Roll, Nanyang, China) and attached to the handle of the needle by inserting the handle into the center of the block.

Figure 2 Site pictures of needle warming moxibustion, electro-acupuncture and TEDing Dianci Pu therapies

The efficacy of the treatment in each group was assessed using WOMAC scores at baseline, the end of the 1st week of treatment, and the end of the 2nd week of treatment. The WOMAC is a widely used, reliable, valid, and responsive measure of treatment outcomes in patients with KOA of the hip or knee. It consists of 24 questions (5 related to the amount of pain, 2 to stiffness, and 17 to physical function), and takes less than 5 min to complete. The WOMAC (Standard edition) used here rates each question on an ordinal scale of 0 to 10; lower scores indicate lower levels of symptoms or physical disability.

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All analyses were conducted using SPSS version 13.0 (SPSS Inc., Released 2005, SPSS Statistics for Windows, Version 13.0, Chicago, IL, USA). Normally distributed data were presented as mean ± standard deviation (x ± s). The χ² test or Wilcoxon rank sum test were used to compare baseline characteristics of the
three groups resulting from the randomization. The paired-samples t-test was also used to analyze the curative effect before and after the treatment. We used a one-way analysis of variance (ANOVA) or a two-way ANOVA to determine the overall effect of usual care, acupuncture, or EA combined with usual care. A post-hoc test (Newman-Keuls test) was then used to determine the statistical differences among the groups. A value of $P < 0.05$ was considered statistically significant.

**RESULTS**

**Change in pain VAS score**

During the treatment period, the pain VAS score for all three groups improved gradually compared with the baseline score ($P < 0.05$). Furthermore, the mean pain VAS score in the treatment and combined groups was significantly decreased after 1 and 2 weeks of treatment compared with that in the drug group ($P < 0.05$). However, no significant difference was observed between the treatment and combined groups after 1 week and 2 weeks of treatment ($P > 0.05$) (Figure 3).

**Change in WOMAC physical function subscale score**

After 1 week of treatment, the physical function subscale score in the combined group was significantly decreased compared with baseline ($P < 0.05$). After 2 weeks of treatment, the physical function subscale score in both the treatment and combined groups was significantly decreased compared with baseline ($P < 0.05$), and the decrease in the combined group was significantly greater than that in the drug group ($P < 0.05$) (Figure 4B).

**Change in WOMAC stiffness subscale score**

After 1 and 2 weeks of treatment, the WOMAC stiffness subscale score in the treatment and combined groups was significantly decreased compared with baseline ($P < 0.05$). After 2 weeks of treatment, the subscale score was also significantly decreased compared with the 2-week score in the drug group ($P < 0.05$). However, the difference between the treatment and combined groups was not significant (Figure 4C).

**Change in overall WOMAC score**

After 1 and 2 weeks of treatment, the overall WOMAC score was significantly decreased in all three groups ($P < 0.05$) compared with baseline. After 2 weeks of treatment, the overall WOMAC score in the treatment and combined groups was significantly decreased compared with the 2-week score in the drug group ($P < 0.05$). However, the difference between the treatment and combined groups was not significant (Figure 4D).

**AQoL-SF36 total score**

The AQoL-SF36 total score in all three groups showed a significant improvement compared with baseline after 1 and 2 weeks of treatment ($P < 0.05$). After 2 weeks of treatment, the total score in the treatment and combined groups was significantly improved compared with that in the drug group ($P < 0.05$). However, there was no significant difference between the treatment and combined groups (Figure 5).

**AQoL-SF36 subscale scores**

A significant improvement in the AQoL-SF36 physical functioning, pain, and general health subscale scores was observed in the treatment and combined groups after 2 weeks of treatment compared with baseline ($P < 0.05$) and compared with the 2-week score in the drug group ($P < 0.05$). In addition, the subscale score for role limitations due to emotional problems and emotional wellbeing was significantly improved in the treatment group compared with the drug and combined groups after 2 weeks of treatment ($P < 0.05$). However, there was no significant difference among the three groups in other domains (e.g., role limitations due to physical health, energy/fatigue, and social functioning) (Table 2).
In clinical practice, non-steroidal anti-inflammatory drugs (NSAIDs) and cyclooxygenase-2 inhibitors are the most commonly used pharmacological agents in the treatment of KOA. However, recent studies have demonstrated that these pharmacological approaches may have limited effects in this patient population, may be associated with potentially serious side effects, and may only marginally reduce short-term pain without inhibiting disease progression. Furthermore, the long-term use of these drugs is associated with adverse events such as gastrointestinal irritation and bleeding, perforated ulcers, and renal and hepatic toxicity. Therefore, patients who experience unsatisfactory results and are at risk of adverse events when using pharmacological agents are recommended to pursue non-pharmacological treatments to improve physical function and to relieve symptoms of KOA, including complementary and alternative therapies such as acupuncture, NWM, EA, and TDP. Furthermore, the results of a Cochrane review indicated that acupuncture for peripheral joint KOA was associated with statistically significant and clinically relevant benefits in waiting list-controlled trials.

Taken together, these findings prompted us to hypothesize that a combination of non-pharmacological therapies might be more effective for the treatment of KOA, given the shorter treatment cycle, fewer side effects, and lower cost compared with pharmacotherapies.

**DISCUSSION**

In clinical practice, non-steroidal anti-inflammatory drugs (NSAIDs) and cyclooxygenase-2 inhibitors are the most commonly used pharmacological agents in the treatment of KOA.20,24 However, recent studies have demonstrated that these pharmacological approaches may have limited effects in this patient population, may be associated with potentially serious side effects, and may only marginally reduce short-term pain without inhibiting disease progression. Furthermore, the long-term use of these drugs is associated with adverse events such as gastrointestinal irritation and bleeding, perforated ulcers, and renal and hepatic toxicity. Therefore, patients who experience unsatisfactory results and are at risk of adverse events when using pharmacological agents are recommended to pursue non-pharmacological treatments to improve physical function and to relieve symptoms of KOA, including complementary and alternative therapies such as acupuncture, NWM, EA, and TDP. Furthermore, the results of a Cochrane review indicated that acupuncture for peripheral joint KOA was associated with statistically significant and clinically relevant benefits in waiting list-controlled trials.

Taken together, these findings prompted us to hypothesize that a combination of non-pharmacological therapies might be more effective for the treatment of KOA, given the shorter treatment cycle, fewer side effects, and lower cost compared with pharmacotherapies. In
the present study, patients with KOA, a disease that can be effectively treated by acupuncture, EA, NWM, and TDP, were selected as the patient population. We examined changes in knee function using the pain VAS, the WOMAC and its subscales, and the AQoL-SF36 and its subscales before and after treatment. We found that both medication and non-pharmaceutical treatment could alleviate pain associated with KOA with longer treatment time. However, there was no clear difference in efficacy between the treatment and combined groups, so this result might be attributable to increased intensity of the stimulus or multiple effects (e.g., electricity, mechanics, and heat) in the treatment and combined groups. Moreover, compared with the non-pharmaceutical therapies, the therapeutic effect of drug treatment on the knee joint is relatively weak and was not superior to the effect observed in the treatment and combined groups in the present analysis. Similar to the results for the pain VAS score, we found that all three treatment groups showed a marked reduction in total WOMAC score, physical function, and stiffness during the treatment period. However, compared with the drug group, the treatment and combined groups showed a better reduction in physical function, stiffness, and total WOMAC scores, although no significant difference was observed between the treatment and combined groups, which may be attributable to the intensity of the stimulus and multiple effects of the EA, NWM, and TDP therapies. Finally, we examined the effects of the three treatments using the AQoL-SF36 questionnaire and its subscales, and found that scores on all eight domains of the AQoL-SF36 were improved in all three groups at different levels. In particular, the physical functioning, pain, role limitations due to emotional problems, emotional wellbeing, and general health domain scores were improved to a greater extent than the other domain scores after 2 weeks of treatment. Moreover, compared with medication alone in the drug group, the treatment and combined groups showed a marked improvement in the pain and general health domains, whereas the role limitations due to emotional problems and emotional wellbeing domain scores showed a greater improvement in the treatment group than in the drug and combined groups. This difference may be attributable to an increased likelihood for patients in the treatment group to accept the non-pharmaceutical EA, NWM, and TDP therapies. These therapies were safe and effective to participants in the treatment group and they received no drugs; these factors may have prompted an improvement in the emotional response of patients in the treatment group compared with those in the drug and combined groups. In the present study, a significant difference in AQoL-SF36 domains such as role limitations due to physical health and energy/fatigue was not observed among the three groups. Given that all three treatments resulted in improvements in these domains from baseline, we surmised that a larger sample size and longer treatment period may be required to identify differences between the groups on these items.

This study had several limitations. First, there was insufficient information about the drug sensitivity of patients, which may have affected the treatment efficacy, because all patients in the drug and combined groups were permitted to take NSAIDs. Second, all patients were recruited from a single center, the First Affiliated Hospital of Henan University of Science and Technology, so the results may not be generalizable to other samples. Finally, all outcome measurements were behavioral indicators and evaluation indexes, unsupported by clinical evidence such as imaging results and hematological data. Further studies are therefore needed to verify the present findings.

In conclusion, the combination of non-pharmaceutical EA, NWM, and TDP therapies showed similar effectiveness with and without concomitant standard pharmacotherapy with respect to pain, stiffness, and general health in patients with KOA. This combination approach may also result in enhanced emotional wellbeing among this patient population, potentially because of its low cost and favorable safety profile.

### Table 2 Changes in AQoL-SF36 scores in three groups after treatment (x ± s)

<table>
<thead>
<tr>
<th>Item</th>
<th>Drug group</th>
<th>Treatment group</th>
<th>Combined group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Baseline 2nd week</td>
<td>Baseline 2nd week</td>
<td>Baseline 2nd week</td>
</tr>
<tr>
<td>Physical functioning</td>
<td>192±41 340±96</td>
<td>198±94 493±116</td>
<td>193±91 418±124</td>
</tr>
<tr>
<td>Role limitations due to physical health</td>
<td>60±25 233±137</td>
<td>67±88 243±122</td>
<td>73±83 247±117</td>
</tr>
<tr>
<td>Role limitations due to emotional problems</td>
<td>77±27 107±51</td>
<td>83±15 183±42a</td>
<td>87±18 137±32</td>
</tr>
<tr>
<td>Energy/Fatigue</td>
<td>183±46 307±51</td>
<td>184±46 331±53</td>
<td>187±55 337±56</td>
</tr>
<tr>
<td>Emotional wellbeing</td>
<td>227±59 271±49</td>
<td>220±38 385±40a</td>
<td>217±77 271±69</td>
</tr>
<tr>
<td>Social functioning</td>
<td>51±24 127±25</td>
<td>55±28 154±29</td>
<td>55±30 172±30</td>
</tr>
<tr>
<td>Pain</td>
<td>105±51 157±46</td>
<td>106±32 217±26a</td>
<td>106±58 223±43a</td>
</tr>
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</table>

Notes: one-way analysis of variance was used to analyze changes from baseline to each outcome by the end of the 1st and 2nd treatment weeks in the three groups; drug group: treated using diclofenac sodium enteric-coated tablets, drugs to activate blood circulation, and sodium hyaluronate; treatment group: treated with a combination of EA, NWM, and TDP therapies; combined group: treated with a combination of usual medications, EA, NWM, and TDP therapies. EA: electro-acupuncture; NWM: needle warming moxibustion; TDP: Tedding Dianci Pu. *P < 0.05 vs baseline, n = 20 per group; †P < 0.05 vs drug group, n = 20 per group.
REFERENCES


