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Original Research Article

Efficacy of acupuncture combined with medication in the treatment of sciatica: A systematic review and meta-analysis of randomized clinical trials

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Abstract

Purpose: *To investigate the efficacy of acupuncture combined with medication in the treatment of sciatica using a systematic review approach.*
Methods: *Databases such as CNKI, Wanfang database, VIP, and PubMed were searched using keywords which include "acupuncture", "electro-acupuncture", "millimeters", "non-steroidal anti-inflammatory analgesic drugs", "corticosteroids", "sciatica", and "vitamins", to identify relevant literature on the treatment of sciatica using acupuncture and moxibustion combined with drugs. The review adopted the Review Manager 5.3 software for meta-analysis of all data.*
Results: *The combined effect size RR = 1.12, Z = 3.5 (p < 0.05), 95 % CI (1.05, 1.20) in the forest plot of overall effectiveness rate. Also, combined diamond of the effective outcome in the forest plot was located on the right side of the midline, the combined effect size STD = -1.25, Z = 7.1 (p < 0.00001), 95 % CI (-1.59, -0.90) in the forest plot of VAS scores.*
Conclusion: *Acupuncture combined with medication treatment reduces pain, and improves total effectiveness and cure rate of sciatica treatment. The exact efficacy still needs to be confirmed by large-scale and multi-center randomized controlled trials (RCT).*

Keywords: *Acupuncture, Medication, Sciatica, Efficacy, Meta-analysis*

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INTRODUCTION

Sciatica is a common clinical disease, and its incidence has been on the rise in recent years [1]. According to statistics, prevalence of sciatica in China reaches 11.5 % - 13.6 %, and this accounts for about 50 % of surgical outpatients and 70 % of orthopedic outpatients [2]. Sciatica includes primary sciatica and secondary sciatica, and secondary sciatica is mainly caused by lumbar disc herniation and sciatica caused by pyriformis syndrome, which accounts for 10 % of the cases due to lumbar disc herniation [3], and 6 % of the cases due to pyriformis syndrome [4]. Sciatica accounts for about 8 % of adult population and 12 % of population aged 15 - 49 years [5], and it is the most traumatizing disease, with a high morbidity rate, and significant disease burden on family members [6]. Current treatment methods for sciatica mainly include surgical treatment and, nonsteroidal anti-inflammatory

and analgesic drugs, corticosteroids, vitamins, and acupuncture [7,8].

Acupuncture and moxibustion have always achieved good clinical efficacy in the treatment of sciatica [9]. Moreover, there is a lack of evidence-based evidence for direct comparison between TCM and Western medicine treatments. Therefore, this study was aimed at investigating domestic and international randomized controlled studies on the treatment of sciatica with acupuncture and medication, and objectively evaluates the efficacy and safety of acupuncture combined with medication in the treatment of sciatica by using systematic evaluation and meta-analysis methods.

METHODS

Search strategy

Databases such as Cochrane Central Register of Controlled Trials (CENTRAL), China National Knowledge Infrastructure (CNKI), Wanfang database, Chonquing Vip, Chinese Science and Technology Journal Database (VIP), and PubMed were searched using keywords which include 'acupuncture', 'electro-acupuncture', 'millimeters', 'non-steroidal anti-inflammatory analgesic drugs', 'corticosteroids', 'sciatica', and 'vitamins', to retrieve relevant literature on treatment of sciatica using acupuncture and moxibustion combined with drugs. Thereafter, a secondary search was conducted with 'sciatica' as the keyword, and all studies were retrieved from the time of database creation to September 2023.

Inclusion criteria

The pain is mainly limited to distribution area of the sciatic nerve, including back of the thigh, posterolateral side of the calf, and the foot, presence of multiple tenderness in the lumbar, lumbar paravertebral, iliac, gluteal, fibular, and ankle points; positive sciatic nerve traction sign, such as the Lasegue sign, Kerning sign, and Bonnnet sign, and often parallel to the severity of pain; significant differences in the degree of muscle strength reduction, which may lead to varying degrees of motor, sensory, reflex, and autonomic nervous disorders. Most affected limbs with weak dorsiflexion of the toes, decreased sensation on the lateral side of the calf, decreased or disappeared Achilles tendon reflex, and even complete or partial weakness or paralysis of the muscles innervated by the sciatic nerve; unlimited age, and gender; blinded or unblinded studies, studies with complete clinical data, and are clinical randomized controlled trials or semi randomized controlled trials with acupuncture and moxibustion as the main treatment for sciatica.

Exclusion criteria

Unclear clinical diagnostic criteria, animal experimental research, review literature, and case reports; non clinical controlled trials, no randomized or study, studies with incomplete basic information, difficulties in contacting the author, and comprising patients with other diseases combined with sciatica.

Study selection and data extraction

After the search was completed, the literature abstract was read independently, preliminary screening was conducted, and eligible studies were included in the review following the inclusion and exclusion criteria. If the conclusions of the researchers are inconsistent, the divergent literature will be discussed or a third researcher will determine whether to include it. The quality of all included studies was scored using the Jadad quality scoring method, with 1 - 3 being low-quality studies and 4 - 7 being high-quality studies [10]. Efficacy evaluation indicators used in this study were ultimately determined to be effective rate and pain threshold [11].

Evaluation of parameters/indices

Treatment effectiveness

The main outcome indicator was treatment effectiveness classified as cure (symptoms of pain and numbness in the waist and lower limbs disappear, free movement of waist, legs can be raised by more than 70 °, and restoration of original work); improvement (there is improvement in lower back pain and lower limb radiation pain, improvement in straight leg elevation test, reduction in the frequency of attacks or pain reduction during attacks, a significant reduction in the frequency of attacks, and still having some pain after stimulation); invalid (symptoms and signs remain unchanged compared to before treatment); and inefficient (refers to the incidence of symptoms and signs of sciatica after treatment that remain unchanged compared to before treatment) [12].

Visual analog scale (VAS)

The VAS produced by the Pain Society of the Chinese Medical Association, commonly used in clinical practice in China, evaluates the effectiveness of pain treatment [13]. A sliding scale with a length of 10 cm was used with a

score of '0' indicating painlessness and a score of '10' indicating most severe and unbearable pain. The scale is used with the patient facing away from the side. The patient marks the scale based on their degree of pain, and the physician scores based on the marked position.

Pain threshold value

The probe of a pain threshold tester was placed vertically at the selected acupoint to push the pressure point. As soon as pain was felt, the pressure was stopped, and the pain threshold was recorded at the measured acupoint.

Adverse reactions

Adverse reactions such as blood loss, needle breakage, and all other adverse reactions related to intervention measures during the acupuncture operation were recorded.

Statistical analysis

All included research literature was reviewed using Review Manager 5.3 software. Count data were represented by odds ratio (OR) at 95 % confidence intervals (CI). When the heterogeneity test result $p > 0.05$ was included in the study, a fixed effects model was used for meta-analysis. When $p \leq 0.05$ in the heterogeneity test, a random effect model was used and the reasons for heterogeneity were analyzed. A funnel plot analysis was used to analyze potential publication bias. In addition, if necessary, sensitivity analysis was used to test stability of the meta-analysis results.

RESULTS

Flow chart of study selection

A total of 686 studies were identified in the initial literature search. Selected and eligible studies were enrolled (Figure 1). As part of the initial screening of titles and abstracts, a total of five randomized, double-blind, controlled trials were included in the meta-analysis comparing acupuncture combined with medication in patients with sciatica [14-18].

Characteristics of included studies

Among the five studies eligible for meta-analysis, 482 subjects were enrolled. Among them, 240 subjects were randomized to receive acupuncture and medication [14-18] (Table 1). The five studies were conducted in China and the duration of therapy ranged from 3 - 24 weeks. The risk of bias showed that the quality of the five randomized controlled trials (RCTs) was moderate (Figure 2).

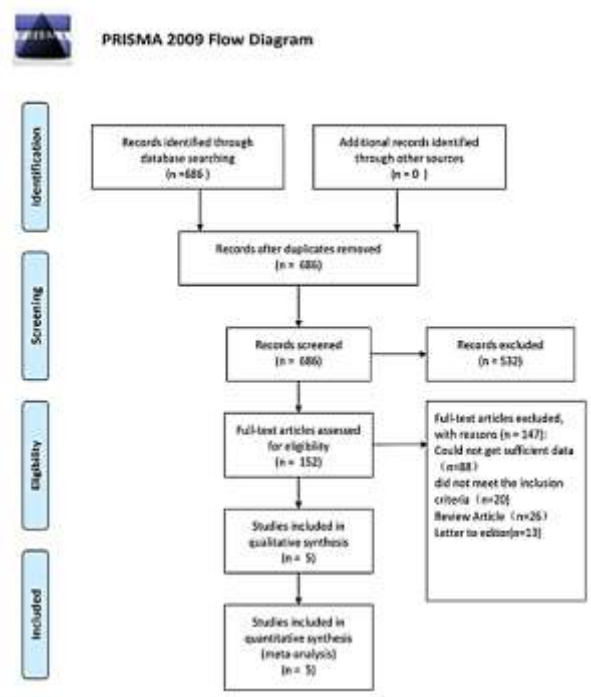

Figure 1: Flow diagram of the literature search process

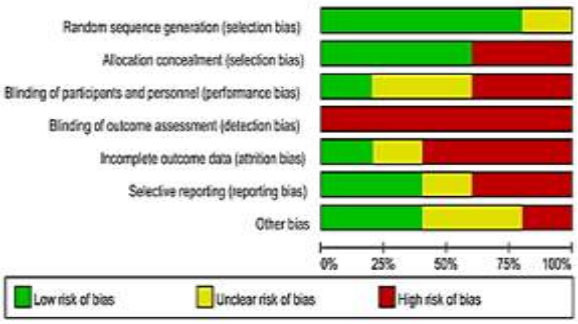

Figure 2: Risk of bias of randomized trials included in the meta-analysis

Overall effectiveness

Meta-analysis of data from the five eligible studies [14-18] showed that overall effectiveness rate was significantly improved in study group (acupuncture combined with medication group) (fixed effect model, RR = 1.12, 95 % CI = 1.05, 1.20) (Figure 3.). Considering heterogeneity existence ($I^2 = 0$ % and $p = 0.0005$), it showed low heterogeneity. The results showed that acupuncture combined with medication treatments improves the overall effectiveness.

Table 1: Characteristics of the 5 randomized controlled Chinese studies used in the meta-analysis

Author and Year	Age (EG vs CG)	Size EG/CG	Doses	Duration of therapy (Weeks)
Jin 2017 [14]	Unclear	30/30	Body pain and blood stasis expelling tang, 1 dose in the morning and 1 dose in the evening	4
Zhang 2017 [15]	Unclear	34/34	Paeonia lactiflora and Glycyrrhiza glabra soup, one dose daily	24
Zhang 2023 [16]	15.93±2.16 vs. 15.36±2.26	48/48	Atractylodes macrocephala soup, 1 dose per day	3
Su 2010 [17]	Unclear	28/28	Tongpao Dingqin Pills, once a day	3
Lin 2007 [18]	39.2±4 vs 39.4±4.1	100/102	Chasing wind and bone penetrating pill, once a day	4

EG represents the exposure or study group, while CG is control group

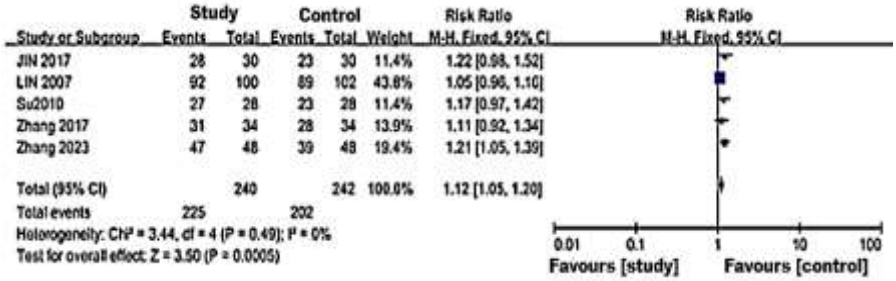

Figure 3: Meta-analysis on overall effectiveness rate in study and control groups

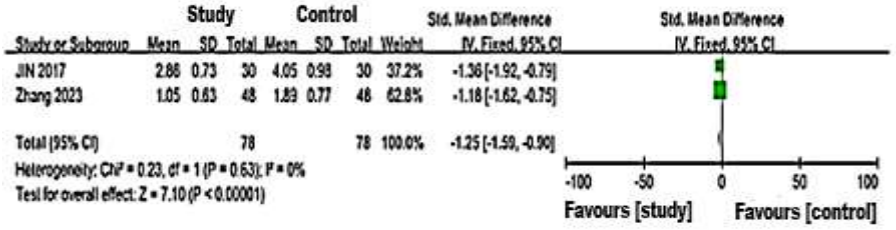

Figure 4: Meta-analysis on VAS scores in study and control groups

Visual analogue scores

Meta-analysis of data from the two eligible studies [14,16] showed that VAS scores significantly reduced in study group compared to control group (fixed effect model, 95 % CI = -1.59, - 0.90) (Figure 4). Considering heterogeneity existence (I^2 = 0 % and p < 0.00001; Figure 4.), it showed low heterogeneity.

Sensitivity analysis and publication bias

The I^2 was all 0 % indicating low heterogeneity, and therefore there was no need for sensitivity analysis. Furthermore, funnel plot for overall effectiveness was constructed and the result revealed no publication bias (Figure 5).

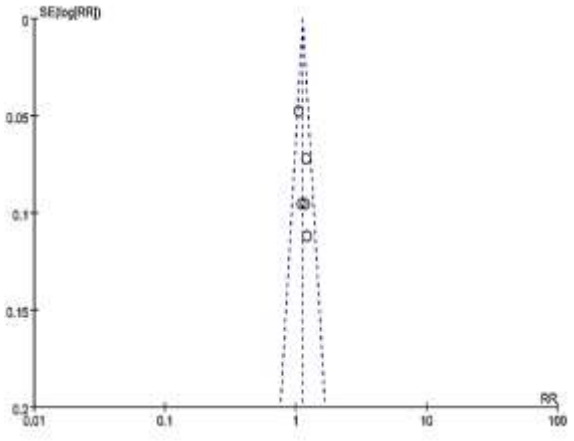

Figure 5: Funnel plot of overall effectiveness rate

DISCUSSION

Sciatica is characterized as pain radiating along the course of the sciatic nerve and sometimes associated with low back pain with corresponding motor or sensory disturbances [19]. Compared with low back pain, which is the primary cause of disability worldwide, sciatica results in greater pain and disability, poorer prognosis and consumes more health resources [20]. Acupuncture has been found to have persistent analgesic effects for some chronic pains (headache, musculoskeletal and osteoarthritis pain), which decreased only 15 % after 1 year [21]. It has been recommended for treating chronic low back pain [22].

Several studies have suggested that acupuncture might be efficacious for chronic sciatica, while the evidence is limited reflecting a lack of high-quality study [23]. Therefore, this study was aimed at investigating the efficacy of acupuncture combined with medication in sciatica treatment using meta-analysis. Combined outcome indicators showed that, compared with control group, overall effectiveness rate improved, and VAS scores decreased more significantly with study group (acupuncture combined with medication).

The mechanism of acupuncture in treating sciatica is as follows involves improvement of microcirculation of the nerves, vasodilatation through axonal reflex, at the same time, activation of the hypothalamus, medulla oblongata and spinal cord plant nerve centers, which improves microcirculation of the diseased area, blocking the vicious circle between microcirculation obstacles and triggering factors, and accelerating the elimination of pain-inducing and inflammatory substances [24]. Acupuncture also regulates inflammatory factors and anti-inflammatory factors [25]. It has been observed in the plasma of surgical patients with good acupuncture analgesia, that prostaglandins and related substances increase the levels of histamine, while serotonin, dopamine and other chemicals are reduced accordingly [26].

Some studies have shown that acupuncture has a good effect on adjusting the plasma cortisol status and controlling inflammation [27]. In addition, the nervous system is also involved in the anti-inflammatory process. In the study of rabbit auricle inflammation, cutting the sympathetic nerve innervating the auricle or cutting the afferent nerve fibers of the dorsal root of the spinal nerve from acupoints has been used to control inflammation [28]. This suggests that the mechanism of acupuncture for radicular pain treatment involves the reduction of inflammatory edema, adjustment of inflammatory factors and anti-inflammatory factors, and pain relief [29].

The brainstem is the most important part of the pathway that promotes the acupuncture response. Experimental results have found that the central and endogenous opiate-like substances may be the most important in the induction of acupuncture analgesia while catechol, especially dopamine, may have antagonistic effects [30]. Other central chemical substances including histamine may potentiate the acupuncture effect [31]. Also, acupuncture stimulates the proprioceptors of the muscle spindle by eliciting a downward control, resulting in muscle relaxation or inhibition of muscle activity. It has been observed that acupuncture improves or eliminates spinal abnormal stresses, corrects its lines of force and restores static and dynamic balance [32].

Funnel plot of this study suggests possible bias. The analysis may be related to the following influencing factors. There is not much description of the study design, randomization methods, and allocation plan in these randomized studies. Furthermore, some studies have varying disease duration, and some studies have not clearly defined the criteria for case dropout and exclusion. Furthermore, the experimental methodology quality of the included literature in this study is relatively low, and further clinical large-scale RCT studies are needed.

Limitations of this study

This study has some limitations. The studies included in this meta-analysis were all completed in China, with effective rate as the main outcome, and no multicenter trials were conducted, which may have an impact on the quality of evidence in this analysis. Also, as a unique traditional Chinese medicine therapy, it is challenging to establish standardized guidelines for stimulation intensity and depth of acupuncture. Therefore, acupuncture will have different efficacy and outcomes. Some studies had a higher risk of bias in random sequence generation caused by insufficient information. Furthermore, there may be a certain risk of publication bias because less than 10 studies were included, and the sample size was small.

CONCLUSION

Acupuncture combined with medication treatment improves overall effectiveness and increases pain threshold. However, due to the low quality of the included test methodology, the

exact efficacy still needs to be confirmed by large-scale, and multi-center RCT studies.

DECLARATIONS

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Ethical approval

None provided.

Availability of data and materials

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

Conflict of Interest

No conflict of interest associated with this work.

Contribution of Authors

The authors declare that this work was done by the authors named in this article and all liabilities pertaining to claims relating to the content of this article will be borne by them.

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