

The effectiveness of acupuncture in patients with low back pain

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ABSTRACT

The incidence of low back pain (LBP) has increased dramatically during the last 20 years. The usual management of LBP is conservative through pharmacologic and non-pharmacologic treatments. One of the non-pharmacologic treatments that are frequently used nowadays is acupuncture. Acupuncture is one of the oldest invasive healing techniques that were used worldwide, which aims to maintain the energy flow and function of the body and has therapeutic, cumulative and analgesic effects. A part of therapeutic acupuncture is electro-acupuncture, in which some of the points used in a treatment protocol are electrically stimulated. The purpose of this study was to review and assess the effects of acupuncture and electro-acupuncture in the management of LBP due to back related conditions. For this reason, a review of the current literature was conducted using the online databases PubMed, Scopus, Science Direct and PEDro and following the PRISMA guidelines. Article titles were searched by using the following keywords: acupuncture, dry needling and low back pain. Primary search on the online databases resulted in 1555 articles. Finally, 19 articles were included in this review. In conclusion, based on the results of different studies, acupuncture seems to be a safe and effective way of managing patients suffering from specific LBP.

Key Words: acupuncture, dry needling, low back pain

Introduction

Low back pain (LBP) is conventionally defined as pain, muscle tension or stiffness localized below the costal margin and above the inferior gluteal folds, with or without associated leg pain (1). There are two different classifications of LBP. The first one relates to its cause and classifies LBP as non-specific (up to 90% of cases, when the pathophysiological source cannot be identified) or specific (when the pathophysiological source can be identified). Patients with specific

LBP are usually diagnosed with lumbosacral muscle strains/sprains (70%), lumbar spondylosis (10%), disk herniation (5% to 10%), spondylolysis (less than 5%), vertebral compression fracture (4%), spondylolisthesis (3% to 4%), spinal stenosis (3%) or with a prior unsuccessful surgery in the back region. The second classification is related to the duration of its symptoms, and classifies LBP as acute (lasting less than 6 weeks), sub-acute (lasting from 6 weeks to 3 months) or chronic (lasting more than 3 months). (2)

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Most often, LBP is managed conservatively with pharmacologic and non-pharmacologic treatments (psychological therapies, multidisciplinary rehabilitation, spinal manipulation, **acupuncture**, massage, exercise and related therapies, and various physical modalities). (3) Rarely LBP is managed with surgical treatment. In fact, surgical treatment is a subject of controversy for doctors and therapists and its indications are constantly redefined. However, sometimes the symptoms and pathology are so severe that surgery cannot be avoided. (4)

The purpose of this study was to review and assess the effects of acupuncture and electro-acupuncture in the management of LBP due to back related conditions. For this reason, a review of the current literature was conducted using the online databases PubMed, Scopus, Science Direct and PEDro and following the PRISMA guidelines. Article titles were searched by using the following keywords: acupuncture, dry needling and low back pain. Inclusion criteria to the study were: randomized controlled trials assessing the effects of acupuncture or electro-acupuncture in the management of specific LBP. Non-randomized controlled trials, study protocols, reviews, case reports and studies published in non-English language were excluded from the review. Primary search on the online databases resulted in 1555 articles. After screening of titles and abstracts, 1390 articles were excluded as inappropriate. From the remaining 165 studies, 147 were rejected for various reasons, leaving 18 studies for analysis. Subsequently, a scan of the articles' reference list was performed to check for more eligible articles to be included in this study. Following the above procedure, 19 articles were finally included in this review. (**Table 1**)

Discussion

Acupuncture is a holistic, blood-free and drug-free method, which uses special thin needles placed in specific parts of the body for the therapeutic restoration of reversible functional diseases, syndromes or symptoms. It is one of the oldest invasive healing techniques used worldwide. (5) The "biomedical" acupuncture is the "western" version and the historical development of the traditional Chinese acupuncture. Although the therapeutic mechanism is common, there are important differences. Medical acupuncture is based on the

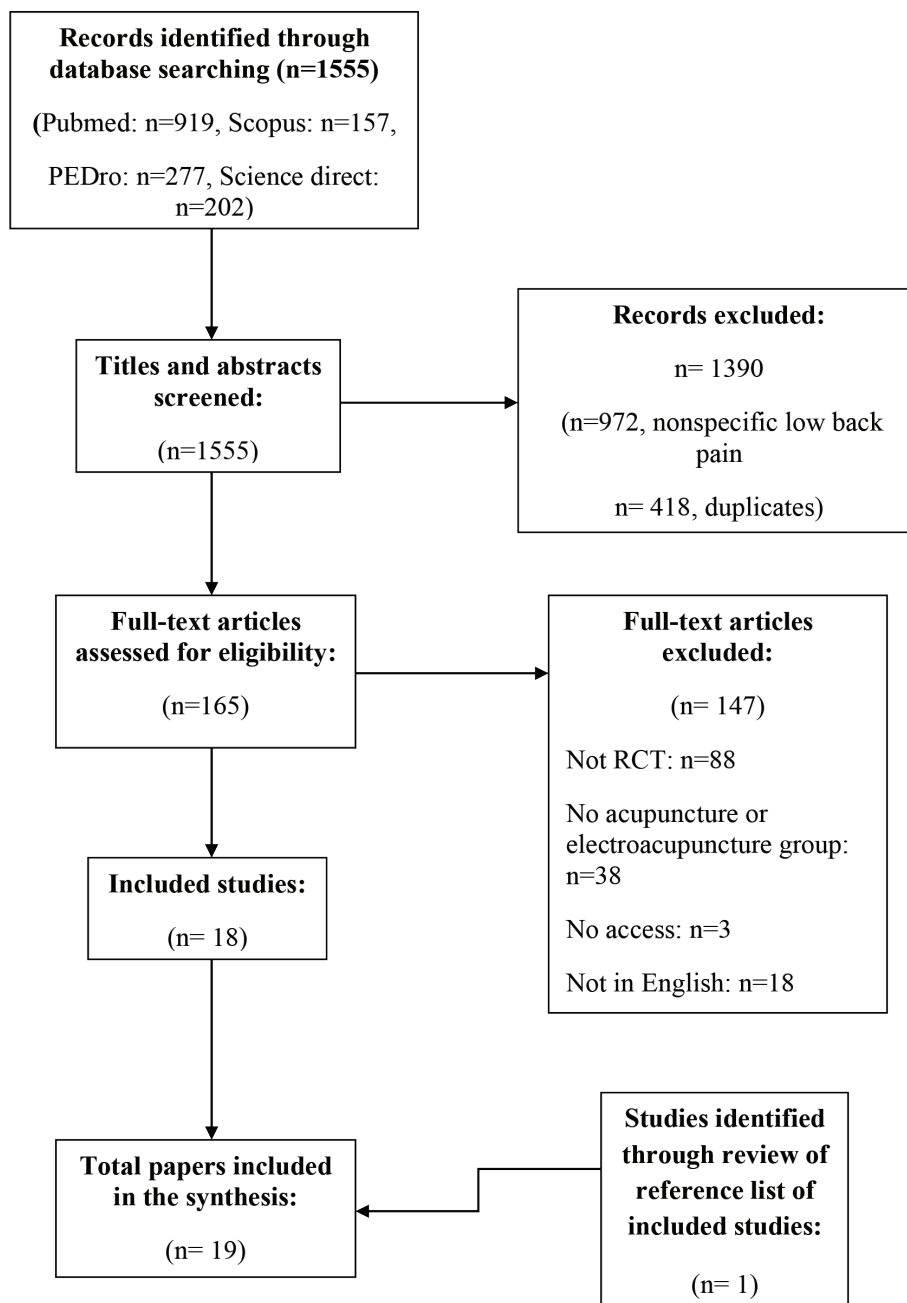
western clinical examination, the contemporary diagnostic approach of the patient, the universally accepted medical terminology, and its mechanisms of action are based on physiology, neurophysiology and follow the rules of biomedical science. In contrast, traditional Chinese acupuncture is based on the concept of vital energy (qi) flowing throughout the body through multiple channels (meridians). Meridians connect the internal organs with the skin and provide channels-paths of communication between the various organs, tissues and cells of the body. They are divided into primary (6 Yin and 6 Yang) and secondary (56 meridians) and are bilateral for each organ. (6)

Apart from body acupuncture, there are also other types of acupuncture, which either involve different parts of the body or the treatment is not performed exclusively by needles. These types include auricular acupuncture (7), electro-acupuncture (EA), acupuncture in combination with moxibustion (8) (9) (10), cranial acupuncture, laser acupuncture, oral acupuncture, nasal acupuncture (rhinoacupuncture), acupuncture of the vagina, acupuncture of the periosteum, acupuncture of the foot etc.

Nowadays, acupuncture is an important preventive and curative treatment for a variety of problems. According to the Neuronal Theory of Acupuncture, the needle is an exogenous stimulus, which follows the same path as all sensory stimuli. After its placement on the skin, fat tissue, muscle, bone or in kinetic or aesthetic fiber and peripheral ganglia, follows the rule of neurons (transduction). It is then transferred to the processing center, where it is modified according to the prevailing conditions and previous experiences (modulation) and finally, it is transferred to the cortex, where it is expressed as a sense (perception). The results of this theory are two distinct actions of acupuncture: acupuncture analgesia, for the inhibition of mainly acute pain, and acupuncture therapy, which is being used in the daily clinical practice for chronic pain syndromes. (11)

As mentioned above, EA is a type of acupuncture, in which some of the points used in a treatment protocol are electrically stimulated, achieving continuous, intense and controlled stimulation parameters. EA increases the effectiveness of traditional acupuncture and expands its range. The main indication for EA is

Table 1: Flowchart



acute (frequency of 150-220 Hz for 20-30 minutes) and chronic pain (frequency of 1-5 Hz for 15-20 minutes). EA is also selected to achieve analgesia before or after surgical repair of vertebral injury (200-3000Hz, high intensity 500-700mA and explosive pulse or pulse scan of different frequencies, while the irritation begins 20-30 minutes before the operation and continuous dur-

ing it). (11) It can be applied bilaterally, at symmetrical acupuncture points or at ipsilateral points of an area or a part of the body. Acupuncture points are divided into 3 major categories: points with an aesthetic substrate (for analgesia), points with a muscular substrate (for therapy), and points with a neural substrate (intense sensation de-qi and contraction of more than

one muscle). It is important to mention that the World Health Organization (WHO) has compiled a list of the main indications of acupuncture. LBP, sprains, sciatica and postoperative pain (among many others) are included in the list of diseases, symptoms or conditions for which acupuncture is considered to be an effective treatment. (12)

The randomized controlled trials that were included in this review assessed the effectiveness of acupuncture and EA in the management of specific LBP by comparing these two techniques to each other and to other treatments as medication, conventional therapies and other forms of acupuncture.

Acupuncture

In a recent study, involving 58 patients with discogenic LBP, researchers compared acupuncture and conventional therapy. Pain intensity was significantly reduced in both acupuncture's ($P<0.001$) and conventional therapy's groups ($P<0.001$). Moreover, LBP kept reducing during the follow-up period. However, the reduction in pain intensity ($P=0.006$) and degree of disability ($P=0.002$) was significantly greater in the intervention group, acupuncture. (13) Another study by Wang et al, including 132 patients, compared the effectiveness of acupuncture and sham acupuncture in the treatment of LBP and sciatica before and after surgery for lumbar vertebral protrusion. Acupuncture proved to be more effective than sham acupuncture, with longer duration, both before and after surgery. It is therefore believed that acupuncture may be a good alternative to medication for the treatment of LBP and sciatica before and after surgery in patients with lumbar disc protrusion. (14) A study by Gu et al, including 60 patients, compared warm needling and acupuncture in chronic LBP. It was noticed that after treatment, VAS scores of both groups decreased significantly and the differences between the groups were statistically significant (both $P<0.05$), with better results in the warm needling group. (8) A study by Guo et al, including 108 patients, examined the effectiveness of triple needling in combination with moxibustion and Tanbo-plucking tender points compared to acupuncture and moxibustion for Third Lumbar Transverse Process Syndrome (TLTPS). The difference in the overall improvement rate was statistically great-

er in the intervention group. (9) A study by Zou et al, compared warm needling and acupuncture in the treatment of TLTPS in 60 patients. Upon completion of treatment, VAS scores in both groups decreased significantly ($P<0.01$), indicating that both methods effectively reduced pain. However, the VAS score in the warm needling group was significantly lower than in the acupuncture group, showing a better effect. (10) A study by Huang et al, including 46 patients, evaluated the efficacy and safety of acupuncture for discogenic sciatica by comparing two groups, one of acupuncture with one of sham acupuncture. It was noticed that the mean VAS scores for sciatica in both groups decreased gradually over the four-week treatment period, with the reduction in the acupuncture group being greater than in the sham acupuncture group. The differences between the two groups in the mean VAS score for LBP were greater than 5 mm at weeks 4, 16 and 28, with no significant statistical significance. (15) A study by Kim et al, including 34 patients, examined the safety and efficacy of a comprehensive 4-week treatment program for inpatient with severe symptomatic LSS in South Korea. MT1 team received Mokhuri Chuna (mobilization and relaxation of the lumbar spine and back muscles), side manipulations, medication and daily acupuncture. In the MT2 team all the other interventions were the same as MT1 group, except medication. In the CMT group, oral medications, epidural steroid injections and physiotherapy, were given. Three months after the treatment, there was no difference between the VAS of the groups for low back and leg pain. Six months after treatment, there were significant differences between groups in VAS for back pain between MT2 and CMT ($P=0.001$) and VAS for leg pain between MT1 and the CMT group ($P=0.01$) and between the MT2 group and CMT ($P=0.003$), indicating that medication could be replaced by other methods. (16) Another recent study, including 72 patients, compared the efficacy of point-toward-point acupuncture in residual back pain after percutaneous kyphoplasty, in chest function and quality of life in patients with osteoporotic fracture, to pharmacological and injectable treatment. After treatment and at the follow-up visit, the VAS score was significantly reduced in both groups (both $P<0.05$). However, VAS was significantly lower in the intervention group proving it is more

effective for pain relief. (17) Another clinical trial, performed on 408 patients, studied the efficacy and safety of integrated TCM therapy for LDH and, therefore, to confirm its clinical effect, compared to a conservative treatment program. Eventually, both groups had a significant reduction in VAS, however the intervention group had a significantly greater improvement. Six months after the intervention, compared to the initial measurements, the changes in the VAS remained significant in both groups, but the difference between the groups was not significant ($P=0.091$). These findings suggest that integrative TCM therapy may be a beneficial complementary and alternative therapy for patients with LBP due to LDH. (18) A study by Yu et al, including 80 patients, studied the clinical effects of acupuncture treatment for LDH, comparing aligned acupuncture to vertical acupuncture. After treatment, VAS scores decreased in both groups. The difference in the treatment group before and after treatment was statistically significant ($P<0.05$) and it was also statistically significant between the two groups, after treatment ($P<0.05$). In contrast, in the control group, the difference was not statistically significant ($P>0.05$), proving that pain improvement was better in the treatment group than in the control group. (19) Finally, a study by Kim et al, including 50 patients, studied the effectiveness and safety of acupuncture in patients with symptomatic lumbar spinal stenosis, compared to conventional therapy. Eventually, there was a significant difference in favor of the intervention group for both LBP (at 3 months) and sciatica (at 6 weeks and 3 months). Overall, 39% of the people who received acupuncture said they were satisfied with their treatment, while in the control group this percentage was only 14%. (4)

Electro-acupuncture

A recent study by Zhang et al, involving 100 patients (22 men and 78 women), compared the effectiveness of EA and moderate-frequency electrotherapy in sciatica and LBP. Back pain was more reduced in the EA group ($P=0.05$) and a statistically greater reduction in sciatica was also noticed ($P<0.001$). (20) In a study by Giles et al, EA, medication (tenoxicam with ranitidine), and spinal chiropractic were compared in the management of chronic (>13 weeks) spinal pain syndromes. The re-

sults of this study, despite its shortcomings, indicate that in patients with chronic spinal pain syndromes, chiropractic, if not contraindicated, is more effective than acupuncture and medication. (21) Another study by Wu et al, including 295 patients, examined the clinical effect and change in the thermogram through EA compared to medication, in people with acute lumbar strain. After the treatments, the improvement rates in the EA group and in the medication group were 71.4% and 42.6% respectively ($P<0.01$), proving that EA has significantly better results. (22) A study by Inoue et al, including 17 patients, investigated the effectiveness of EA of the spinal nerve root using a selective spinal nerve blocking technique to treat lumbar and hip symptoms in patients with vertebral stenosis. Eventually, the 17 patients who received EA, all showed significant improvement over time in LBP, lower extremity pain, lower limb numbness and continuous walking distance ($p<0.01$ for all parameters). (23) A study of the same author, including 9 patients, investigated the effectiveness of pudental nerve EA for LBP and sciatica in patients with lumbar spinal stenosis, one week after conventional acupuncture treatment in this area. Finally, 6 out of 9 patients reported that their sciatica decreased after treatment, 4 out of 9 reported that the aesthetics of the area increased, and 4 out of 5 increased their continuous walking distance. However, no one showed more than 30% improvement in LBP. Therefore, it is believed that pudental nerve EA is effective only when acupuncture has not previously had a significant effect on the patient. (24)


Acupuncture vs Electro-acupuncture

A recent study by Miao et al, including 73 patients, compared the effectiveness of EA and acupuncture in LBP due to TLTPS. Eventually, pain decreased in both groups, but the reduction was greater in the EA group. (25) Another study by Wu et al, compared the effectiveness of acupuncture with qi-guiding to EA in the treatment of LDH. Eventually, the difference in the overall outcome between the two groups was not statistically significant, proving that both treatment protocols can be effective in treating LDH. The recovery rate in the intervention group was significantly higher than in the control group. (26) A study by Chen et al, including 180 patients, assessed the clinical effect of

treating LDH by needling the points on both sides of the impaired lumbar vertebrae, while randomly dividing patients in three groups. In the treatment group, basic and auxiliary acupuncture points were selected, combined with hydro-acupuncture, EA and chiropractic. The acupuncture team received acupuncture and medication. The last group received only medication. In the end, there was statistically significant difference between the effectiveness of the intervention group and the other two groups. Also, in the intervention group there was no deterioration of any patient after half a year. (27)

Based on the results of the studies mentioned above, it becomes obvious that acupuncture is really effective in patients with specific LBP. Indeed, in the majority of the studies, acupuncture's efficacy was superior to other interventions that were applied. Positive results were mostly obtained by a combination of acupuncture techniques, i.e. warm needling, EA, triple needling plus moxibustion plus tanbo plucking, aligned acupuncture, etc. Regarding the etiology of LBP, it seems that some interventions are superior to others in certain pathologies. Specifically, it was noticed that for Lumbosacral muscle strains/sprains and Triple Transverse Process Syndrome, warm needling, EA, chiropractic spinal manipulation and triple needling plus moxibustion had the best results. For disc herniation, EA, acupuncture, and a combination of "acupuncture,

hydro-acupuncture, EA, manipulation" are recommended. Moreover, for spinal stenosis, "Mokhuri Chuna, acupuncture, and/ without herbal medication", EA and acupuncture showed better results. Last but not least, acupuncture, point-to-point acupuncture and EA were shown to be very effective in managing LBP before and after surgery. Thus, acupuncture may be an effective alternative to oral medication for the management of LBP before and after surgery in patients with lumbar disc protrusion. In fact, in many cases, surgery can be avoided by using alternative therapies.

However, further examinations and longer follow-ups are necessary, due to the chronicity of the diseases being studied, so that the results are more reliable. Objective measurement of the patients' symptoms must also be ensured, as pain is subjective and affected by social conditions and high expectations. It's really important to ensure that enough follow-ups will be made, to test the duration of the therapies' effectiveness. A sufficient number and homogeneity in the sample size of the studies should also be secured. Finally, more studies examining the effect of acupuncture without the simultaneous application of other treatments, as well as studies comparing the types of acupuncture with each other, would be very useful. 

A Conflict of interest

The authors declare no conflicts of interest.

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