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Is Acupuncture Effective for Treating Sciatica Pain in Adults?

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A SELECTIVE EVIDENCE BASED MEDICINE REVIEW

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ABSTRACT

OBJECTIVE: The objective of this selective EBM review is to determine whether or not acupuncture is effective for treating sciatica pain in adults.

STUDY DESIGN: A systematic review of one randomized controlled trial, randomized single-blinded controlled trial and one nonrandomized controlled trial.

DATA SOURCES: All articles were published in English between 2017 and 2019 and obtained from peer-reviewed journals using PubMed.

OUTCOMES MEASURED: Change from baseline in average leg pain at week 4 measured using the visual analog scale (VAS) in Huang et al. and the NRS score Zhang et al. Postpartum sciatica pain measured by patient reported recovery in He et al.

RESULTS: In the single-blind RCT conducted by Huang et al. there was a decrease in average leg pain with a VAS score of 31.15 mm in the acupuncture group and 19.91 mm in the sham acupuncture group ($p=0.026$). In the RCT by Zhang et al. the EA group showed a significant decrease in average leg pain with a NRS score 2.30 compared to the MFE control group with an NRS score of 1.06 ($p<0.001$). In the nonrandomized controlled trial by He et al. patient reported recovery was 100% in the acupuncture group and only 20% in the control group being treated with bed rest ($p<0.0001$).

CONCLUSIONS: Articles by Zhang et al. and Huang et al. displayed a greater change in baseline average leg pain compared to the control groups and the article by He et al. showed resolution of postpartum sciatica pain after 4 weeks of treatment with acupuncture therapy proving it is an efficacious way of treating sciatica pain. Further studies with larger, more diverse sample sizes, control groups similar to acupuncture so blinding can be achieved, longer treatment periods and longer term follow up must be conducted to confirm the validity of these results.

KEY WORDS: Acupuncture, therapy, sciatica

INTRODUCTION

Sciatica is a symptom that describes pain and paresthesia radiating along the path of the sciatic nerve. The sciatic nerve is the largest nerve in the body and branches from the lower back through the hip and buttock, down the back of the leg. Sciatica occurs when there is excess pressure on this nerve which can be caused by a number of underlying pathologies including muscle injury/spasm, herniated discs, degenerative disc disease, lumbar spinal stenosis and spondylolisthesis.[1] Piriformis syndrome may also cause sciatica pain. It is an uncommon neuromuscular disorder that occurs when the piriformis muscle located in the buttocks compresses the sciatic nerve which in turn causes pain.

Sciatica pain can be extremely debilitating to patients that are affected leading to severe distress. It oftentimes interferes with patients' mobility and activities of daily living. Sciatica has an annual incidence of about 1-5% peaking in the fourth decade of life.[1] Lifetime incidence is anywhere from 10-40%.[1] The exact healthcare costs for treatment of sciatica has not been established but on an individual level it can cost American patients with health insurance anywhere from $200-$2000 per year and those without health insurance about $20,000 – $50,000 per year to treat definitvely.[2]There is not an exact number stating the amount of health care visits that were related to sciatica pain in recent years as literature is lacking in concise epidemiologic data. However, in the year 2008 there were about 61.7 million low back pain visits in the United States with approximately 5% of these individuals presenting with sciatica pain giving an estimate of about 1.8 million healthcare visits that year.[3]

The pain caused by sciatica is often unilateral and irritation of the nerve can lead to weakness and decreased knee and ankle reflexes.[4] The sciatic nerve is composed of the L4-S2 nerve roots which fuse in the pelvis through the sciatic foramen posteriorly. When it exits the

pelvis the nerve makes its way around the piriformis anteriorly and inferiorly and posterior to the gemellus superior, gemellus inferior, obturator internus and quadratus femoris. The nerve then enters the posterior thigh and makes its way through the biceps femoris. The sciatic nerve ends behind the knee in the popliteal fossa where it branches into the common fibular and tibial nerves.[1] When pathology occurs in this pathway causing compression of the sciatic nerve, pain occurs. The pain is often described by the patient as a stabbing, shooting or burning that is worsened with prolonged sitting, coughing, sneezing, twisting or straining. Risk factors for developing sciatica include advancing age, pregnancy, taller heights and obesity.[5]

Treatment for sciatica pain varies from person to person depending largely on the severity of symptoms, its chronicity and the underlying etiology. Conservative management is usually first line. Medications to manage pain include NSAIDS, steroids, muscle relaxants and in severe cases, opioids. For patients unwilling or unable to take medications, nonpharmacologic treatments are also available, however the efficacy of these types of treatment modalities are somewhat uncertain due to lack of data. Examples include physical therapy to correct posture and strengthen muscles in the back, massage therapy to relax tight muscles in the back that may be contributing to pain and chiropractic manipulation aimed at improving the alignment of the spine. If refractory to conservative treatment patients may also try epidural steroid injections and if all else fails, last line treatment is surgery for sciatic nerve decompression.[4] Many conservative treatments are not curative and may cause intolerable side effects like addiction, stomach ulcers and constipation.[6] On the other hand, surgery is considered a more effective method in treating sciatica pain compared to conservative methods but is invasive and often reserved for those with the most severe symptoms. Also, few benefits exist in pain relief or functional improvement one year after surgery compared to conservative treatments.[7] Acupuncture relieves pain by releasing

the body's natural pain killing chemicals known as endorphins, relaxing tight muscles and improving blood circulation. It also stimulates the release of serotonin.[8] This all works together to lessen compression on the sciatic nerve, decrease the perception of pain and improve mood in the suffering individual. Studies have shown that acupuncture can alleviate inflammatory and neuropathic pain, making it a possible effective treatment for sciatica pain.[7] This paper examines two randomized controlled trial (RCTs) and one nonrandomized controlled trial to evaluate the efficacy of acupuncture in treating sciatica pain in adults.

OBJECTIVE

The objective of this selective EBM review is to determine whether or not acupuncture is effective for treating sciatica pain in adults.

METHODS

Two randomized controlled trials and one nonrandomized controlled trial were used in this review. They were found by searching PubMed using the key words "acupuncture", "therapy", and "sciatica" and were chosen based on their relevance to the clinical question and the inclusion of patient oriented outcomes. Inclusion criteria consisted of studies published in or after 2010 and studies in humans. Exclusion criteria consisted of studies published before 2010 and studies in species other than humans. The population being studied were adults between the ages of 26 and 65 years old with sciatica pain. Specifically, in the studies by Zhang et al. and Huang et al. they focused on adults suffering from discogenic sciatica.[6,7] In the study by He et al. the focused population were patients with postpartum sciatica.[9] The applied intervention was acupuncture in all three studies specifically electroacupuncture (EA) in the study by Zhang et al.[6,7,9] All three studies used different comparison groups. In the study by Zhang et al. medium-frequency electrotherapy (MFE) was used, while the studies by He et al. and Huang et al. used

bed rest and sham acupuncture respectively.[6,7,9] The outcome measured in the studies by Zhang et al. and Huang et al. were the same, being the change from baseline in average leg pain. In the study by He et al. the outcome measured was postpartum sciatica pain.

Keywords used in search of these articles were "acupuncture," "therapy," and "sciatica." Studies were chosen based on their relevance to my clinical research question with the inclusion criteria being that the study must have been published in or after 2010 and involve only humans, and exclusion criteria being any studies published before 2010 and studies involving species other than humans. The studies also had to include patient-oriented outcomes. PubMed was the database used to find these studies, all of which were published and in English. The statistics used in this systematic review include p-value, mean change from baseline, confidence interval, and NNT. Demographics and characteristics of all three studies are shown in Table 1 on page 5.

OUTCOMES MEASURED

The outcome of focus in the studies by Zhang et al. and Huang et al. were change from baseline in average leg pain intensity at 4 weeks of interventional therapy with acupuncture. The study by Huang et al. used the visual analog scale (VAS) to measure this outcome.[7] The VAS was represented as a ruler with a length of 0-100mm. Zero mm represented no pain and 100 mm represented their worst pain ever experienced.[7] Patients were asked to make a mark on the ruler to represent their average leg pain in the past week.[7] In the study by Zhang et al. the primary outcome was measured using the 11 point numerical rating scale (NRS) with 0 representing no pain and 10 representing the most severe pain.[6] Patients were asked to rate their average leg pain intensity over the prior 24 hours. The average leg pain NRS score at week 4 was equal to the mean value of the NRS scores obtained at the three treatment sessions during the 4th week.[6] The primary outcome in the study conducted by He et al. was postpartum sciatica pain measured

using patient reported recovery after 4 weeks of treatment.[9]

RESULTS

Zhang et al. conducted a randomized controlled trial comparing the effectiveness of electroacupuncture (EA) versus medium frequency electrotherapy (MFE) for treating discogenic sciatica in adults.[6] A total of 138 patients were screened for this study.[6] Based on specific inclusion and exclusion criteria displayed in Table 1 below, 36 were excluded and 2 withdrew at baseline.[6] The remaining selected patients were then randomized using a computerized random number generator with 50 patients placed in the experimental group receiving EA and 50 in the control group receiving MFE.[6] During the trial, patients were not permitted to use analgesic drugs or other treatments to treat their sciatica.[6] Both groups were treated once daily for 5 sessions per week for the first 2 weeks followed by 3 sessions per week for the following 2 weeks with each session lasting 20 minutes.[6] During the study, 8 participants withdrew from the study during treatment due to the presence of aggravating symptoms, 1 exited due to travel, 1 withdrew due to an unsatisfactory curative effect and 3 were lost to follow-up totaling 13% patients lost.[6] Between the two groups only 3 participants were lost from intervention group receiving EA group and 10 from the control group receiving MFE, with all 3 lost to follow up from the control group.[6] The numerical rating scale (NRS) was used to assess change from baseline in average leg pain at the 4th week of treatment in both groups.[6] The baseline leg pain NRS showed no significant between group difference with the EA baseline leg pain NRS being 4.66 ± 1.88 and the MFE baseline leg pain NRS score being 4.35 ± 1.28. As seen in Table 2, the mean change from baseline to the 4th week in the average leg pain intensity NRS score in the EA group was 2.30 with a 95% confidence interval (CI) between 1.86-2.75 and in the MFE groups the NRS score was 1.06 with a 95% CI between 0.62-1.51.[6] The two groups both showed

Table 1. Demographics & Characteristics of Included Studies

Study	Type	# Pts	Age (yrs)	Inclusion Criteria	Exclusion Criteria	W/D	Interventions
Zhang (2017)[6]	RCT	100	18 – 70	Pts aged 18-70 y/o whose sciatic sxs correlated with MRI or CT findings with pain lasting more than 3 months	Pts with progressive neuro sxs, have had lumbar surgery within 6 months, sxs from conditions other than disc herniation, pain in both legs, CVA/liver/kidney or blood disease, have received electrotherapy in past week, pregnant or lactating, pts. with metal allergies	13	Electroacupuncture manipulation at bilateral acupoints located in the lumbar region 0.5 inches lateral to the posterior median line with a needle inserted at a depth of 1.5 inches vs. medium frequency therapy at same acupoints with two pairs of 107 x 72 mm electrodes.
Huang (2019)[7]	RCT	46	18 – 75	Pts aged 18-75 y/o with sciatica for at least 12 weeks	Pts who need surgery for severe lumbar disc herniation, pts who have neuro deficits, use anticoagulation, have CV or endocrine disease, mental illness, pregnant or lactating, hx of spinal surgeries, received acupuncture in past 30 days.	2	Acupuncture therapy with disposable Hwato needles at bilateral acupoints in prone position using a 0.35 x 75 mm needle inserted about 40-70 mm into BL25 until de qi sensation occurred vs. blunt tipped needled into same acupoints with no skin penetration
He B-S (2018)[9]	NRCT	111	26 – 42	Women within 1st 3 months of giving birth having sxs of unilateral leg pain with PE findings supporting this.	Pts suffering from sciatica due to disc herniation, spinal stenosis, tumors, pelvic injury or lumbar muscle strain	0	Acupuncture therapy at various acupoints using filiform silver acupuncture needles of 30-60mm in length and 0.3mm in diameter inserted at a depth of 5-30 mm with a De qi sensation vs. bed rest

significantly greater reductions in NRS scores compared with baseline but the EA group showed a more significant decrease than the MFE group.[6] The estimate of treatment effect is precise between the groups as there was a statistically significant difference ($p < 0.001$).[6]

Table 2. Change from Baseline in Average Leg Pain Intensity NRS Scores from Zhang et al.[6]

	EA group Mean (95% CI)	MFE group Mean (95% CI)	Differences	P-value
Week 4	2.30 (1.86-2.75)	1.06 (0.62-1.51)	1.24 (0.59-1.88)	<0.001

Huang et al. conducted a randomized single-blinded controlled trial analyzing the efficacy and safety of acupuncture for treating chronic discogenic sciatica.[7] In this study a total of 182 patients were screened and based on the exclusion and inclusion criteria presented in Table 1, 136 patients were excluded leaving 46 patients remaining in the study.[7] The patients were randomized using a computerized random number generator and were split into two groups of 23 patients each; one group receiving acupuncture and the other group receiving sham acupuncture.[7] In the acupuncture group patients were treated with disposable Hwato needles at bilateral acupoints which were inserted until de qi sensations occurred. De qi is a sensation that includes numbness, soreness, distension or other sensations while needling.[7] In the sham acupuncture group, patients received treatment at the same acupoints instead with blunt tipped needles that did not involve skin penetration or elicit a de qi sensation.[7] Both groups received 3 sessions a week for 4 weeks with each session lasting 30 minutes.[7] Patients were permitted to take analgesics in cases of severe pain along with bed rest.[7] Two patients in the sham acupuncture group dropped out due to travel and family reasons which equated to a 4% loss of patients during the study.[7] The visual analog scale (VAS) was used to assess pain. The outcome of focus in this systematic review is the change from baseline in mean VAS scores for leg pain at week 4.[7] The baseline average VAS in leg pain was quite similar in both the acupuncture (62.66

± 15.56) and sham acupuncture group (60.36 ± 15.34). By week 4, there was a decrease in average leg pain in both groups. As seen in Table 3, in the acupuncture group the average change from baseline VAS score was -31.15 with a 95% CI between -36.91 to -2.40 and in the sham acupuncture group it was -19.91 with a 95% CI between -19.91 to -11.61.[7] The negative values are used to show that the pain decreased. The estimate of treatment effect is precise because between the groups there was a statistically significant difference (p = 0.026).[7]

Table 3. Change from Baseline in Average VAS Score for Leg Pain from Huang et al.[7]

	Acupuncture group Mean (95% CI)	Sham acupuncture group Mean (95% CI)	Differences	P-value
Week 4	-31.15 (-36.91 to -2.40)	-19.91 (-28.20 to -11.61)	-11.25 (-21.06 to -1.44)	0.026

He et al. conducted a nonrandomized controlled trial evaluating effectiveness of acupuncture therapy in patients with postpartum sciatica.[9] A total of 111 patients were recruited over a 6 year period based on certain inclusion and exclusion criteria stated in Table 1.[9] Eighty-six patients were placed in the interventional group to receive acupuncture.[9] They attended acupuncture therapy sessions 3 times a week for 4 weeks for 30-45 minutes as tolerated per session.[9] Patients who did not want to receive acupuncture were placed in the control group (25 patient) and underwent a minimum of 2 hours of bed rest 3 times a week for 4 weeks at home.[9] Although there was a large difference in population size between both groups, demographics were similar. Postpartum sciatica pain was measured based on patient reported recovery. As seen in Table 4, after 4 weeks of acupuncture treatment all 86 women in the acupuncture group reported complete or nearly complete disappearance of symptoms giving 100% patient reported recovery.[9] In the control group receiving bed rest, 5 of the patients reported complete or near complete recovery giving 20% patient reported recovery (Table 4).[9] Using these percentages the calculated RBI was 4, ABI was 0.8 and NNT was 2, all of which are noted in Table 5. The

estimate of treatment effect is precise because between the groups there was a statistically significant difference ($p < 0.0001$).

Table 4. Patient Reported Recovery After Treatment

	Acupuncture group (n = 86) n (%)	Control group (n = 25) n (%)	P-value
After last session of acupuncture treatment at week 4	86 (100)	5 (20)	<0.0001

Table 5. Calculations for Treatment from He et al.[9]

	EER	CER	RBI	ABI	NNT
Calculations	1.00	0.20	4	0.80	2

DISCUSSION

Sciatica can be extremely debilitating to those suffering with its symptoms and finding an effective treatment in those with chronic sciatica pain has not been an easy feat as it often presents in many ways and varies from person to person. Acupuncture has been suggested to be a minimally invasive treatment for sciatica with very little to no adverse effects. This systematic review analyzed the efficacy of treating sciatica pain with acupuncture therapy. Two of the articles did this by evaluating change from baseline in average leg pain at the 4th week of treatment in those with chronic discogenic sciatica and one article assessed patient reported recovery of postpartum sciatica pain. All articles demonstrated precision in the treatment effect, with p-values <0.05.

All three articles showed an improvement in pain at the end of 4 weeks of treatment, however the clinical significance in the reduction of pain differed. In the study conducted by Zhang et al., the leg pain NRS score showed a significant difference between the EA and MFE groups with a mean difference of 1.24 points.[6] Typically, a reduction of about 2-3.5 points in the

NRS score represents a minimal clinically important difference thus the change in leg pain NRS score in the EA group did not show a clinically important difference compared to the MFE group.[6] However, it must be noted that the control group was not a placebo but a positive treatment so an effect size of 1.24 is considered a large effect.[6] In the study by Huang et al., acupuncture showed a moderate effect in relieving leg pain by the 4th week with a between group difference in the mean VAS score of 11.25mm.[7] According to the American College of Physicians clinical practice guideline which measure the effect magnitude of treatment and timing of outcomes, a small effect was defined as a 5-10mm decrease, a medium effect as 10-20mm and a large effect as >20mm, classifying the effect of treatment at the 4th week as a medium effect.[7]

In the study by He et al., 100% of patients receiving acupuncture therapy experienced resolution of their postpartum sciatica by the 4th week of treatment compared to only 20% in the control group being treated with bed rest for 2 hours 3 times a week.[9] However, even though there was significantly enhanced perceived recovery, it must be noted that there was no significant difference between the acupuncture and control group at the 12 month follow up point.[9] This draws into question how effective acupuncture is in treating sciatica long term.

A concern regarding the articles in this systematic review is the lack of diversity in the population being studied. Because alternative medicine such as acupuncture is not widely practiced in western medicine, finding studies with patients in the U.S. was difficult. All the articles used in this review were based in China limiting the generalizability of the results. Because acupuncture is not a widely accepted treatment in the U.S. getting insurance companies to pay for the treatment may be difficult. Another specific limitation posed in the study by Zhang et al. was failure to address the specific aggravating symptoms that caused 8 of the patients to

withdraw from the study.[6] Blinding was not able to be achieved in the studies by Zhang et al and He et al. due to the significant difference in the intervention from the comparison group.[6,9] The assignment of patients to treatments was randomized in two of the studies but in the study be He et al. participants were divided into the acupuncture and control group as per their choice so randomization was not achieved.[9] Also, in the studies by Zhang et al. and Huang et al. some participants were lost to follow up but "worst case" analysis was not done on them.[6,7] Overall, some common limitations among all three studies was the small sample size and short treatment periods.

CONCLUSION

All three studies demonstrated improvement in sciatica symptoms with the use of acupuncture. Articles by Zhang et al. and Huang et al. displayed a greater change in baseline average leg pain compared to the control groups and the article by He et al. showed significant resolution of postpartum sciatica pain after 4 weeks of treatment with the use of acupuncture therapy proving acupuncture to be an effective way of treating sciatica pain.[6,7,9] No serious adverse side effects were reported with any of the patients in the study. Future studies should include a broader population study group in terms of ethnicity and culture to enhance the generalizability of the results and lessen chances of any possible bias. Studies conducted comparing the efficacy of acupuncture with known physical therapy techniques like massage therapy or chiropractic manipulation may also be beneficial to further understand the efficacy of acupuncture as treatment for sciatica pain. Additionally, further studies should also look to include control groups comparable to acupuncture so blinding can be achieved to increase the validity of results. Larger sample sizes, longer treatment periods and long term follow up can also help verify the validity of the results analyzed in this review.

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