

SOUTH BAYLO UNIVERSITY

Acupuncture Therapy on Sciatica: A Systematic Review and Meta-Analysis

by

Caroline Han

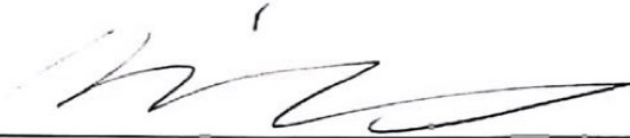
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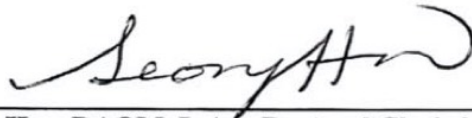
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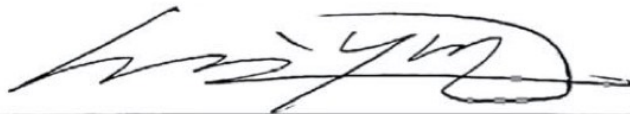
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ABSTRACT

Background: Sciatica is a common pain disorder which typically presents in forms of gluteal or low back pain that may radiate to one leg, with sensory or motor disturbances. Various studies have demonstrated clinically the therapeutic effect and safety of acupuncture therapy for sciatica.

Objective: To systematically investigate the clinical effect and safety of acupuncture therapy as alternative medicine to the conventional medicine (CM) for sciatic pain.

Methods: Randomized controlled trial (RCT) studies published from their inception to September 30, 2020 were searched from electronic databases of Wangfang, PubMed and EBSCOhost. The primary outcomes of the review were the total effective rate (TER) and Visual Analog scale (VAS) score, and the secondary outcomes were adverse effects (AEs) and relapse of the interventions.

Results: Thirteen studies involving 1542 participants with sciatica were pooled for the meta-analyses. In this review, TER and VAS score of acupuncture therapy groups were significantly improved compared to the other therapy groups on sciatica ($p < 0.0001$ and $p = 0.0009$ respectively). In safety, the AEs and relapses of acupuncture therapy were fewer than ones of the

other therapies.

Conclusion: Although acupuncture therapy on sciatic pain showed significant effect in the review, the results should be interpreted with caution due to poor methodologies of included studies.

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I. INTRODUCTION

Sciatica is a common medical disorder with prevalence up to 40% in life time of the general population, which typically presents in the form of gluteal or low back pain that may radiate down to feet or toes of one leg with motor or sensory complaints.^{1,2} Recently, sciatica is a global concern for its high prevalence with annoying pain.^{3,4}

About 90% of cases of sciatica are caused by sciatic nerve root compression due to herniated discs of L4,5 and S1, but tumors and lumbar stenosis can cause it as well.^{5,6} Sciatica is largely diagnosed by taking histories such as the distribution and radiation below the knee of the pain, and by physical examination that depends on neurological tests indicating neurological deficit or nerve root tension.⁶ Most cases of sciatica recover in less than 4 to 6 weeks without long-term complications if the neurological deficit is not present.⁶ A randomized trial that conducted a comparison of NSAIDs (non-steroid anti-inflammatory drugs) and placebo on acute sciatica reported that in first care, 60% of the patients were resolved in 3 months and 70% in 12 months.⁷

There is a consensus in treatments of sciatica. The first options for the treatment are conservative approaches such as analgesics, NSAIDs and muscle relaxants, but if sciatic symptoms are not resolved within 6 to 8 weeks by the above, then invasive treatments including surgery are indicated as the second alternatives.⁶ According to a randomized trial, surgical treatment was better than a conservative one for one year after the treatment, whereas there were no significant differences among them after four years of follow-up.⁸ Even conservative interventions seem not to be more effective than placebo on sciatica.⁶ It, thus, becomes necessary to develop more effective and holistic approaches with few or mild adverse effects (AEs) in the treatment of

sciatica.

Acupuncture has been performed to treat various diseases using specific meridians and their acupoints for over 2500 years, especially in China, Korea and Japan. Recent studies have confirmed the therapeutic effects and safety of acupuncture for certain diseases.⁹⁻¹⁴ Sciatica in traditional Chinese medicine (TCM) might be consistent with “flank and leg pain” due to Qi-blood stasis caused by waist strain, sprain, trauma, and other injuries.¹⁵ For treating sciatica, GB (the foot Shaoyang gall bladder) and BL (the foot Taiyang bladder) meridians are used as the major meridians because of their distribution along the sciatica dermatome.¹⁶

OBJECTIVES

The aims of this review to investigate the clinical effect and safety of acupuncture therapies for sciatica and to conduct qualitative analyses of eligible studies:

1. To compare the effects of acupuncture therapies and the other ones on sciatica through meta-analyses of TER and VAS score of included studies.
2. To compare the safety and the continuity of the interventions with AEs and relapse rates.
3. To perform the risk of bias and sensitivity analyses of included studies for methodological quality and objectivity of the studies.

II. MATERIALS AND METHODS

The reporting of the review followed the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) guidelines and recommendations of *PLoS Medicine*.¹⁷

Ethical Review

This systematic review was reviewed and determined as an exempt case from evaluation by Institutional Review Board of South Baylo University on September 5, 2020.

Search and Selection Strategy

The electronic databases of Wangfang, PubMed and EBSCOhost were searched from the inception of the RCT to September 30, 2020. The search terms were used as the following for compact results; sciatica, acupuncture, randomized controlled trial in sequence. Then, the titles and abstracts were screened for the full texts, which were finally screened for the eligible studies.

Inclusion/Exclusion Criteria

Studies were included if they met following conditions: (1) patients only had sciatica for one week or more and were allocated at random; (2) experimental intervention was acupuncture therapy alone, where acupuncture therapy includes electro-acupuncture (AE) and acupuncture with moxibustion; (3) control interventions were different therapies from acupuncture; (4) their outcomes concluded TER or VAS score. Whereas, studies were excluded if they met the following conditions: (1) patients had sciatica caused by other serious diseases, or were not allocated at random; (2) experimental interventions were irrelevant to acupuncture therapy or

acupuncture integrated with other therapies; (3) control interventions are relevant to acupuncture therapy, or there were severe data losses in experimental procedure reporting; (4) outcomes did not include TER or VAS score.

Data Extraction and Items

Data interested in the review were extracted from each eligible study using a predefined form. Its items were details of the first author, year, sample size, age, duration of intervention, experimental and control interventions, outcome measures such as TER and VAS score, follow-up period, dose of interventions, AEs and relapse rate.

Risk of Bias within the Individual Studies

For the methodological quality of the eligible studies, the risk of bias was assessed using the Cochrane Risk of Bias Assessment Tool which comprises seven qualitative elements: random sequence generation (selection bias)- allocation concealment (selection bias)- blinding of participants and personnel (performance bias)- blinding of outcome assessment (detection bias)- incomplete outcome data reporting (attrition bias)- selective outcome reporting (reporting bias)- other bias.¹⁸

Outcome Measures and Analyses

The primary outcomes of the review were TER and VAS score, and the secondary outcomes were AEs and relapse rate of the interventions. RevMan 5.3 software for windows (The Nordic Cochrane Centre, Copenhagen, Denmark) was used to perform the meta-analysis. For the end-point scores of the analysis, were used risk ratio (*RR*) and standardized mean difference (*SMD*)

with the associated 95% confidence intervals (*CI*s) and *p*-values for dichotomous and continuous data, respectively. The random-effects model was assumed for combining data because the variation of effects across the included studies could follow a distribution. To indicate the heterogeneity of the associated studies, I^2 statistic was evaluated, where I^2 value of 50% or more is considered to indicate a substantial heterogeneity.¹⁹

III. RESULTS

Study Selection

At the first stage which applied sciatica and acupuncture, a total of 733 associated citations were provided from Wangfang, PubMed and EBSCO host. After applying RCT, there remained 114 articles for screening of titles and abstracts. Then, there were included 22 articles for screening of full texts, and finally, 13 eligible studies²⁰⁻³² were identified for qualitative and quantitative syntheses. (Figure 1)

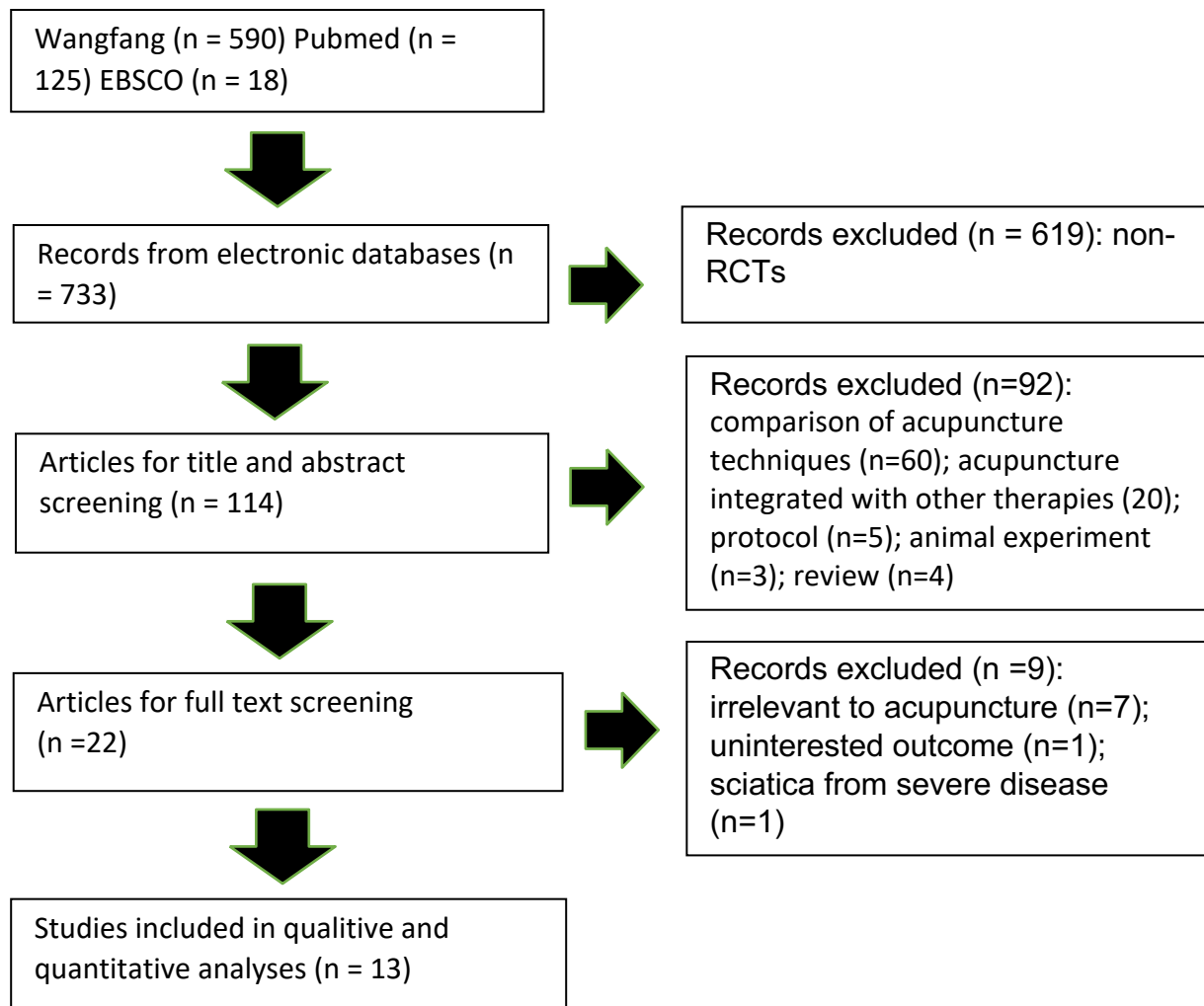


Figure 1. PRISMA Flow Chart of Study Selection

Study Characteristics

Included studies for the review comprised 13 RCT studies²⁰⁻³² which compared the acupuncture therapy with other therapies on sciatica; involved 1542 participants with sciatica; and were published in Chinese or English from their inception to September 30, 2020. Among them, 12 studies²¹⁻³² reported TER in outcomes, 4 studies²⁰⁻²³ VAS score, one study²⁰ AE, and one study²⁸ relapse. Ages of patients ranged from 16 to 82 years, and durations of the interventions were between one week and 3 months. (Table 1)

Table 1 Characteristics of Included Studies with Risk of Bias

First Author	Sample ¹ (exp:con)	Age ² (IC)	Experimental Intervention	Control Intervention	³ Outcomes	⁴ Risk of Bias
Huang 2019 ²⁰	46 (23:23)	18-75 (at least 12 weeks)	Bilateral acupoints of Dachangshu (UB25), Shenshu (UB23), Weizhong (UB40), Chengshan (UB57) for 4 weeks.	Sham acupuncture	VAS, ODI, SF- 36, AE	L-L-L-L-L-L-L
Luo 2018 ²¹	124 (62:62)	18-75 (2-26 monthss)	Weizhong (UB40), Chengshan (UB57), Kunlun (UB60), Yinlingquan (SP9), Sanyinjiao (SP6), Taixi (KD3) for 6 weeks.	Celecoxib capsules orally for 6 weeks.	TER, VAS	L-U-U-U-L-U-U
Wang 2017 ²²	72 (36:36)	18-70 (0.5-5 years)	Three yang channels of the feet for 4 weeks	Placebo for 4 weeks	TER, VAS	L-U-U-U-L-U-U
Wang 2016 ²³	100 (50:50)	20-73 (1-6 months)	Yaoyangguan (DU3), Yinlingquan (SP9), Shenshu (UB23), Taixi (KD3), Taichong (LV3) for 10 days	Massage for 10 days	TER, PSQI, VAS	
Zhou 2015 ²⁴	252 (126:126)	20-75	Opposite houlder sensation point for 2 weeks	Loxoprofen sodium tablets 60 mg, 3 times a day for 2 weeks	TER	L-U-U-U-L-U-U
Chen 2009 ²⁵	60 (30:30)	34.24±5.7 8 years (the average illness course of 5.25±3.59 years)	Shenshu (UB 23), Dachangshu (UB 25), Huantiao (GB 30), Weizhong (UB 40) and Kunlun (UB 60) on the affected side. once a day for 10 days as one therapeutic course with a 3-day interval between 3 courses.	Nimesulide tablets twice a day, for 10 days as one treatment course with a 3-day interval between 3 courses.	TER, pain threshold	L-U-U-U-L-U-U

Zhang 2009 ²⁶	88 (44:44)	19-70 (0-28 months)	S3-5 Jiaji points, Huantiao GB 30), Weizhong (UB 40), Yanglingquan (GB 34), Fengshi (GB31), Shenshu (UB23), Kunlun (UB60) for 10 days	Yaokitong capsule, Vitamin B _{1,12} for 10 days	TER	L-U-U-U-L-U-U
Zou 2009 ²⁷	82 (52:30)	38-72	Huantiao (GB30), Fengshi (GB31), Zusanli (ST36), Yanglingquan (GB 34), Weizhong (UB40), Juegu (GB39) Kunlun (BL 60) 30 minutes a day for one week	Fenbid 300 mg twice a day for one week	TER	L-U-U-U-L-U-U
Chen 2008 ²⁸	160 (80:80)	21-75 (0-45 months)	Zhongzhu (SJ3), Houxi (SI3) for 3 months	Quick-acting sciatica Pills (Japanese brand)	TER, mJOA, Relapse	L-U-U-U-L-U-U
Sun 2006 ²⁹	152 (78:74)	24-69 (0-1.3 years)	Shenshu (UB23), Dachangshu (UB25) on both sides, Huantiao (GB30), Weizhong (UB40), Chengshan (UB57) for 30 days	Bid for 30 days	TER, PRI	L-U-U-U-L-U-U
Nie 2004 ³⁰	92 (46:46)	17-60 (2-30 days)	Huantiao (GB30), Fengshi (GB31), Yanglingquan (GB 34), Dachangshu (UB25), Weizhong (UB40), Chengshan (UB57) for 4 weeks	Prednisone for 4 weeks	TER	L-U-U-U-L-U-U
Zou 2001 ³¹	180 (90:90)	16-82 (0-5 years)	Shenshu(UB23), Dachangshu(UB25), Huantiao(GB30), Weizhong(UB40) for one month	Massage at Shenshu (UB23), Dachangshu (UB25), Huantiao(GB30), Weizhong (UB40) and Ashi points for one month	TER	L-U-U-U-L-U-U
Zhou 2000 ³²	134 (86:48)	22-65 (one week-3 years)	Huantiao (GB30), Yanglingquan (GB 34), Feiyang (UB58), Ashi points for one week	Fenbid tablets for one week	TER	L-U-U-U-L-U-U

¹exp: con = experimental group: control group. ²IC = Illness Course. ³Outcomes: AE = Adverse Effect, mJOA = modified Japanese Orthopedic Association, ODI = Oswestry Disability Index, PRI = Pain Rating Index, PSQI = Pittsburgh Sleep Quality Index, SF-36 = 36-Item Short Form Health Survey, TER = Total Effective Rate, VAS = Visual Analogue Score, ⁴Risk of Bias: random sequence generation-allocation concealment-blinding of participants and personnel-blinding of outcome assessment-incomplete outcome data reporting-selective outcome reporting-other bias; L= Low Risk of Bias, U = Unclear Risk of Bias, H=High Risk of Bias.

Risk of Bias within the Included Studies

All the studies²⁰⁻³² conducted the randomization sequence which uses computer systems, random sampling numbers or a simple randomization method and did complete outcome data reporting. All the studies but Huang 2019²⁰ did not explicitly explain the other qualitative methodologies. (Table 1)

Meta-Analyses of Outcomes

The total effective rate (TER)

The total effective rate of acupuncture therapy was significantly higher than that of the other ones with a moderate heterogeneity of 12 RCTs:²¹⁻³² $n = 1448$; $RR [95\% CI] = 1.14 [1.09, 1.20]$, $p < 0.0001$; $I^2 = 39\%$. (Figure 2)

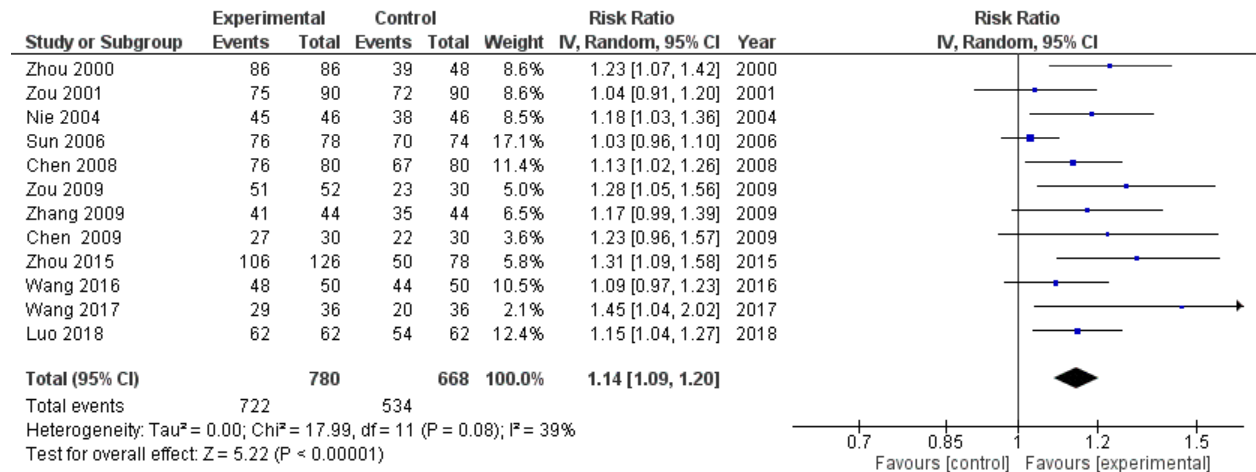


Figure 2. Meta-Analysis of Total Effective Rate

Visual Analogue Score (VAS)

The VAS score after acupuncture therapy was significantly lower than that after the other therapies, but with a substantial heterogeneity of 4 RCTs:²⁰⁻²³ $n = 342$; $SMD [95\% CI] = -0.90 [-1.43, -0.37]$, $p = 0.0009$; $I^2 = 81\%$, indicating a substantial heterogeneity. (Figure 3)

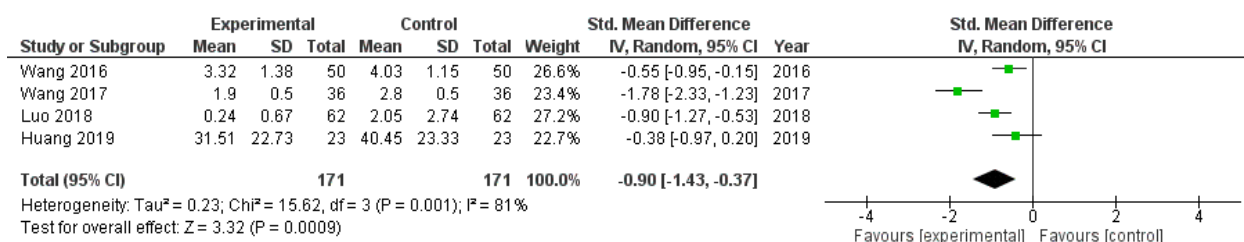


Figure 3. Meta-Analysis of Visual Analogue Score (VAS)

Sensitivity Analysis

Sensitivity analysis was performed for 12 RCTs²¹⁻³² in terms of TER. The group showed one outlier and an asymmetry that indicates the publication bias in the lower part of smaller studies with moderate negative correlation between RR and SE , where SE indicates standard error.

(Figure 4)

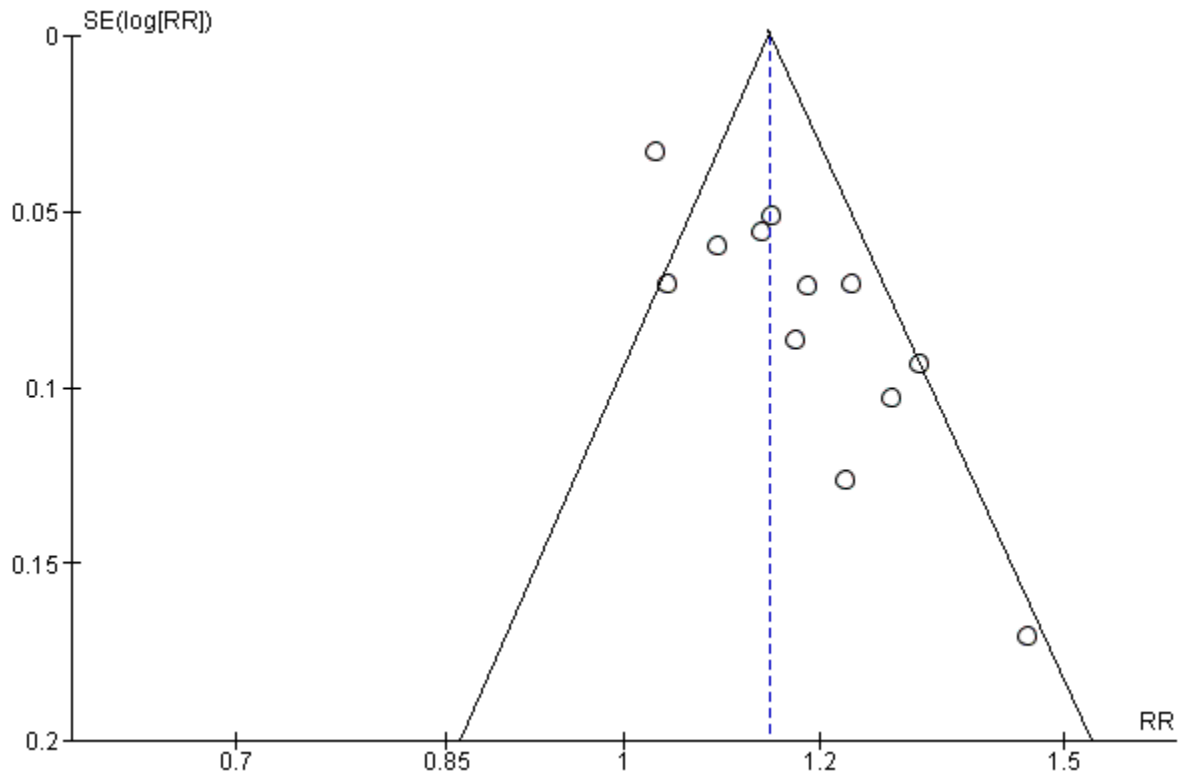


Figure 4. Funnel Plot of Studies in terms of Total Effective Rate

Safety

Adverse effect

Only Huang 2019²⁰ reported two cases of mild hematoma after needling in the acupuncture group and three cases for which a Chinese herb decoction was prescribed in the sham acupuncture group.

Relapse rate

In Chen 2008 study²⁸, there were 17 relapse cases in the therapeutic group and 41 cases in the control group.

IV. DISCUSSION

Sciatica is a common disorder in our lifetime and managements of it vary greatly from conservative modalities to invasive treatments. Traditionally, relatively conservative therapies which include physical therapy, stretching, nonsteroidal anti-inflammatory medications, steroid medications, muscle relaxants, and epidural steroid injections, have varied rates of success. It has been often difficult to predict who will respond to them and who will not. In addition, some treatments such as medications, and epidural steroid injections have risks of potential serious side effects associated with them. Meanwhile, acupuncture may provide a noble alternative to the armamentarium of treatment modalities that range from conservative medications to maximally invasive surgical procedures.

Acupuncture works through microinjury, which increases local blood flow, facilitating healing by recruitment of inflammatory factors integral for wound healing³³. Furthermore, acupuncture needle stimulates local nerves, which can also augment vasodilation through axon-flex, a response normally seen in peripheral tissue injury³⁴. By acupuncture, the release of 5-hydroxytryptamine and enkephalin which pain relieving neurotransmitters, has been suggested in pharmacodynamics³⁵.

In this review, there are several limitations in demonstrating the effectiveness and safety of acupuncture therapy for sciatica. First, the included studies but Huang 2019²⁰ did not explicitly report on the methodological qualities other than the random sequences and complete outcome data. Second, the present review did not conduct pooled analyses for safeties of AE and relapse of acupuncture therapy for sciatica as only Huang 2019²⁰ and Chen 2008²⁸ reported AE and

relapse, respectively. Finally, there were three data bases of Wangfang, PubMed and EBSCOhost in the review, which may indicate insufficient databases for objectiveness.

V. CONCLUSION

In this review, acupuncture therapy on sciatic pain showed significant effects in forms of TER ($p < 0.0001$) and VAS score ($p = 0.0009$). In safeties of two interventions, the incidents of AE and relapse of acupuncture therapy were fewer than ones of the other therapies. However, the results should be interpreted with caution due to poor methodologies of included studies in the review. Further studies with rigorous methodology and follow-up are required to verify objectiveness for effectiveness and safety of acupuncture therapy on sciatica.

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