

# Effect of auricular point pressing therapy on postoperative pain of fracture

## A protocol for systematic review and meta-analysis

Zhe Yin, MD<sup>a</sup>, Wenjun Zhang, MD<sup>a</sup>, Yi Zeng, MD<sup>a</sup>, Xi Su, MB<sup>b,\*</sup> 

### Abstract

**Background:** In clinical practices, postoperative fracture patients are often treated with analgesics. As one of the alternative therapies for non-drug analgesia, auricular point pressing has advantages of simple operation, easy to use, no injury and adverse reactions, and great potential for development. In this study, the effect of auricular point pressing therapy on postoperative pain of fracture was objectively evaluated through the method of meta-analysis, so as to provide evidence for clinical applications.

**Methods:** PubMed, Web of Science, Cochrane Library, EMBASE, Wan Fang Database, Chinese Scientific Journal Database, China National Knowledge Infrastructure Database, and Chinese Biomedical Literature Database were systematically searched and randomized controlled trials on auricular point pressing in the treatment of postoperative pain after fracture were included. After independent literature screening, data extraction and quality evaluation by 2 researchers, the original data was retrieved, merged, and analyzed. RevMan 5.3 software was adopted for meta-analysis.

**Results:** This study could provide high-quality evidence to evaluate the effect of auricular point pressing therapy on postoperative pain of fracture.

**Conclusion:** This systematic review explored whether auricular point pressing therapy is effective on the intervention of postoperative pain after fracture.

**OSF Registration Number:** DOI 10.17605/OSF.IO/AZ4JQ.

**Abbreviations:** RCT = randomized controlled trial, TCM = traditional Chinese medicine.

**Keywords:** auricular acupoint pressing, meta-analysis, postoperative pain in fracture, protocol

## 1. Introduction

The postoperative pain of fracture mainly is a certain degree of acute pain, and is a complex physiological reaction caused by body itself and surgical trauma.<sup>[1]</sup> Pain has become the fifth vital

sign, followed by body temperature, pulse, breathing, and blood pressure.<sup>[2]</sup> At the same time, the pain after fracture can promote the release of various endogenous substances in human bodies, act on skeletal muscle, myocardial or vascular smooth muscle, increase peripheral circulation resistance, and produce adverse reactions such as elevated blood pressure and accelerated heart rhythm.<sup>[3]</sup> Postoperative fracture patients often take analgesics to relieve pain. Effective postoperative analgesia can reduce the secretion of catecholamine in patients, inhibit stress reaction, and contribute to the rehabilitation of patients.<sup>[4]</sup> However, improper administration of analgesics may cause adverse reactions such as gastrointestinal discomfort, liver and kidney function damage, cardiovascular system damage, and so on.<sup>[5-7]</sup>

Auricular point therapy of Traditional Chinese Medicine (TCM) is one of the external therapies with the characteristics of TCM, including pressing, acupuncture, bloodletting, needle imbedding, Tuina, and other operations.<sup>[8-10]</sup> According to TCM, auricular points are specific acupoints distributed on the auricle of human body, and they are the reaction points of pathological changes of Zang-fu Organs and meridians and collaterals on body surface.<sup>[11,12]</sup> According to bioelectricity theory, the abnormal bioelectricity in pathological changes of the human body can cause the decrease of the resistance of corresponding auricular points. Related studies proved that after 1 to 2 weeks of applying voltage to the auricle skin of peritonitis rats, the low resistance state of the skin around auricle improved.<sup>[13]</sup>

Clinically, auricular point pressing is the most commonly applied auricular point stimulation method at present, with

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<sup>a</sup> Key Laboratory for Biorheological Science and Technology of Ministry of Education (Chongqing University), Chongqing University Cancer Hospital, Chongqing, <sup>b</sup> Department of Community Family Health, Maternal and Child Health Hospital of Hubei Province, Wuhan, Hubei Province, China.

\* Correspondence: Xi Su, Department of Community Family Health, Maternal and Child Health Hospital of Hubei Province, No. 745, Wu lu road, Hongshan District, Wuhan, Hubei Province 430070, China (e-mail: 15807146389@139.com).

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advantages of long-lasting effect, simple operation, and less side effects.<sup>[14]</sup> Clinical reports proved that this therapy plays a positive role in the intervention of headache, insomnia, and neurasthenia.<sup>[15–17]</sup> At present, the effect of auricular point pressing therapy on postoperative pain of fracture lakes meta-analysis, thus hindering the spread of evidence. Therefore, according to the objective clinical needs, this study conducted a systematic review and meta-analysis of randomized controlled trials (RCTs) on the effect of auricular point pressing therapy on postoperative pain after fracture, so as to provide support for the spread of evidence.

## 2. Methods

### 2.1. Study registration

The protocol of this review was registered in OSF (OSF registration number: DOI 10.17605/OSF.IO/AZ4JQ). It was reported to follow the statement guidelines of preferred reporting items for systematic reviews and meta-analyses protocol.<sup>[18]</sup>

### 2.2. Inclusion criteria for study selection

**2.2.1. Types of studies.** A RCTs was enrolled to investigate the effects of auricular plaster therapy on postoperative pain after fracture surgery published in Chinese and English.

Non-RCTs, cohort studies, case reports, experimental studies, the data of the included study are missed or incomplete, and duplicate publications were excluded

**2.2.2. Types of participants.** Regardless of nationality, race, gender, occupation, and educational background, patients after fracture surgery were included. Patients with pain caused by tumors, nervous system diseases, and other causes were excluded.

**2.2.3. Types of interventions.** The experimental group was treated with auricular point pressing therapy. The control group was treated with placebo, drugs, or other alternative therapy.

### 2.2.4. Types of outcome measures

**2.2.4.1. Primary outcomes.** Postoperative visual pain simulation score.

### 2.2.4.2. Secondary outcomes.

- 1) Adverse reactions.
- 2) Number of pain outbreaks.
- 3) Patient satisfaction.

### 2.3. Data sources

PubMed, Web of Science, Cochrane Library, EMBASE, Wanfang Database, Chinese Scientific Journal Database, China National Knowledge Infrastructure Database, and Chinese Biomedical Literature Database were systematically searched.

### 2.4. Searching strategy

The details of PubMed's search strategy are illustrated in Table 1, including all search terms, while similar search strategies are applied to other electronic databases.

### 2.5. Data collection and analysis

**2.5.1. Selection of studies.** Two researchers independently carried out literature screening, data extraction and cross-

**Table 1**

Search strategy in PubMed database.

Number	Search terms
#1	Fractures[Title/Abstract]
#2	Fracture[Title/Abstract]
#3	or/1–2
#4	Auricular[Title/Abstract]
#5	Point[Title/Abstract]
#6	Points[Title/Abstract]
#7	or/5–6
#8	#3 and #4 and #7

checking, and dissenting literatures or data were decided by the third researcher. According to the selection and exclusion criteria, the literature screening and data extraction were conducted strictly, and the whole screening and extraction process was recorded. The screening flow chart of this study is demonstrated in Figure 1.

**2.5.2. Data extraction and management.** Two independent researchers extracted data from qualified literatures and filled out data collection forms. Any objection would be resolved by consensus or consultation with a third researcher. Excel 2013 was used for data management. We extracted the following data: title, first author, year of publication, country, journal, age, sex, sample size, inclusion and exclusion criteria, baseline, intervention details, follow-up time, outcome indicators, and bias risk.

**2.5.3. Assessment of risk of bias.** The quality evaluation of literatures is based on Cochrane handbook system evaluation manual. The quality evaluation items include:

- (1) Is the allocation method random?
- (2) Is it hidden?
- (3) Whether to adopt the blind method, or not?
- (4) Is there any incomplete data?
- (5) Is there selective bias?
- (6) Are there any other biases?

According to the criteria, the included studies were divided into 3 levels: low, medium, and high.

**2.5.4. Measures of treatment effect.** Standard mean difference with 95% confidence intervals. was used as continuous data, and the dichotomous outcomes were estimated by the risk ratio with 95% confidence intervals.

**2.5.5. Management of missing data.** If any data is missing, requesting the original data by email. If the missing data cannot be obtained, the data could be excluded from the study.

**2.5.6. Assessment of heterogeneity and data synthesis.** Heterogeneity test:  $Q$  test was applied to qualitatively determine inter-study heterogeneity: If  $P \geq .1$ , there is no inter-study heterogeneity, and if  $P < .1$ , there is inter-study heterogeneity. Meanwhile,  $I^2$  value is adopted to quantitatively evaluate the inter-study heterogeneity: If  $I^2 \leq 50\%$ , the heterogeneity is considered to be good, and the fixed-effect model would be adopted. If  $I^2 > 50\%$ , it indicates significant heterogeneity, and the source of heterogeneity would be explored through subgroup analysis or sensitivity analysis. If there is no obvious clinical or methodological heterogeneity, it would be considered as statistical heterogeneity, and the random-effect model would be applied for analysis. Descriptive analysis would be used if there is

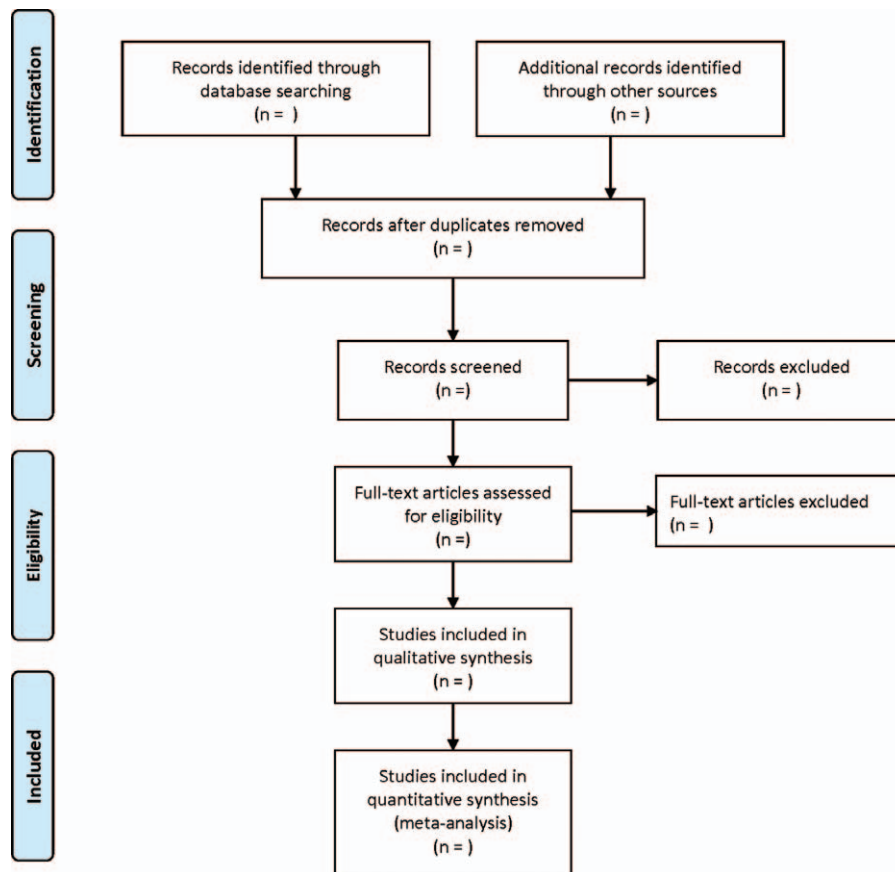


Figure 1. Flow diagram of study selection process.

significant clinical heterogeneity between the 2 groups, and subgroup analysis is not required.

**2.5.7. Assessment of reporting biases.** If more than 10 studies are included, a funnel chart would be utilized to assess the report bias.<sup>[19–21]</sup> In addition, publication bias was further quantitatively evaluated by Egger and Begger test.

**2.5.8. Subgroup analysis.** When heterogeneity is discovered (such as different types of treatment, different types of fractures, patient age, and publication year), subgroup analysis would be applied to find out the source of heterogeneity.

**2.5.9. Sensitivity analysis.** Through the study of large weight of elimination effect, the sensitivity analysis was performed to test the stability of the results of meta-analysis.

**2.5.10. Ethics and dissemination.** The content of this article does not involve moral approval or ethical review and would be presented in print or at relevant conferences.

### 3. Discussion

Clinically, patients after fracture surgery are often treated with analgesics, including opioid analgesics and nonsteroidal anti-inflammatory drugs. Improper administration of analgesics may cause adverse reactions such as tolerance, dependence, toxic reactions, mental reactions, gastrointestinal reactions, liver and kidney function damage, cardiovascular system damage, and so on.<sup>[22,23]</sup>

With the change of modern medical model, orthopedic patients have higher requirements for nursing, and patients and medical staff are no longer satisfied with simple fracture healing. Instead, they pursue a series of physical and mental therapeutic effects, including pain management, functional rehabilitation, and orthopedic care.<sup>[24]</sup> Among them, the mode of pain management changed from a single mode with anesthesiologists as the main body to a combined mode with nurses as the main body. Auricular plaster therapy in TCM is a traditional and common therapy for nondrug analgesia.<sup>[25]</sup> It is easy to operate, without injury and rare adverse reactions.<sup>[26]</sup> Although many clinical studies confirmed that auricular point pressing therapy is effective for postoperative pain after fracture, its efficacy and safety are still controversial.

The purpose of this study was to systematically review and evaluate all RCTs of the effect of auricular point pressing therapy on postoperative pain after fracture. The systematic review and meta-analysis of this article provide convincing conclusions for the efficacy and safety of auricular point pressing therapy for the treatment of postoperative pain after fracture. In addition, this study helps clinical doctors and nurses to intervene postoperative pain of fracture, benefit patients, and provide reliable reference for its wide application.

### Author contributions

**Conceptualization:** Wenjun Zhang.

**Data curation:** Wenjun Zhang.

**Formal analysis:** Wenjun Zhang, Yi Zeng.

**Investigation:** Yi Zeng.

**Methodology:** Yi Zeng.

**Project administration:** Xi Su, Zhe Yin.

**Resources:** Yin Zhe, Yi Zeng.

**Software:** Zhe Yin, Yi Zeng.

**Supervision:** Xi Su.

**Validation:** Xi Su.

**Visualization and software:** Zhe Yin.

**Visualization:** Zhe Yin.

**Writing – original draft:** Zhe Yin and Xi Su.

**Writing – review & editing:** Zhe Yin and Xi Su.

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