



Acupuncture for labor pain management: A systematic review

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Acupuncture is widely used to alleviate symptoms in a variety of painful conditions. In obstetrics and gynecology, acupuncture has also been applied to a range of conditions including labor pain. This systematic review aims to critically evaluate the evidence on analgesic effect of acupuncture during labor. Computerized literature searches of 7 databases were performed for randomized clinical trials (RCTs) of acupuncture involving needle insertion for pain during labor. Three RCTs were identified and their methodologic quality was generally good. Two RCTs compared adjunctive acupuncture with usual care only and reported a reduction of meperidine and/or epidural analgesia. One placebo acupuncture controlled trial showed a statistically significant difference in both subjective and objective outcome measures of pain. No adverse events were reported in any of the trials. It is concluded that the evidence for acupuncture as an adjunct to conventional pain control during labor is promising but, because of the paucity of trial data, not convincing. Further research is warranted to clearly define its place in labor pain management. © 2004 Elsevier Inc. All rights reserved.

Acupuncture is an important treatment modality of traditional Chinese medicine involving stimulation of specific points by manually inserting and manipulating fine needles with the aim of curing disease and/or promoting health. In addition to manual needling, several other methods are used for stimulation of acupuncture points, for example, electrical stimulation, laser, and moxibustion (burning herbal preparations containing *Artemisia vulgaris* or mugwort on acupunc-

ture point). The most commonly used is manual acupuncture where fine, disposable stainless steel needles are inserted into selected acupuncture points and manipulated by rotating to elicit a characteristic needle sensation called De-Qi. The choice of stimulation modality, acupuncture points, and manipulation method mainly depends on therapist experience/preference, patients, and conditions and is often individualized.

Since the 1970s, acupuncture research has been one of the most intensely researched areas of complementary and alternative medicine, and a considerable amount of literature has accumulated on the subject.^{1,2} Acupuncture has been used, in particular, for a variety of painful conditions and some of them are supported by good evidence from controlled clinical trials.³⁻⁶

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In obstetrics and gynecology, acupuncture is applied for a range of conditions, including dysmenorrhea, morning sickness, breech version (moxibustion, ie, burning herbal preparations containing *A vulgaris* or mugwort on acupuncture point), labor induction, analgesia during oocyte retrieval, and labor.^{7,8} Several observational studies^{9,10} or nonrandomized, retrospective, controlled studies^{11,12} suggest that acupuncture is effective for relieving labor pain but the evidence is contradictory.

Therefore, this systematic review was conducted to critically evaluate and summarize all the evidence from randomized clinical trials (RCTs) of acupuncture as a supportive analgesic method during labor.

Methods

Systematic literature searches were conducted in the following electronic databases: MEDLINE, EMBASE, AMED, CINAHL, PsycINFO, British Nursing Index, and The Cochrane Library (all from their inception to December 2003). The search terms were acupuncture, electroacupuncture, labour/labor, and childbirth. Combinations of these key words were used and no language restriction was imposed. The references of all located articles were reviewed and our department's own files on acupuncture were hand-searched for further relevant articles.

Studies were included if they were prospective, randomized, clinical studies of acupuncture, electroacupuncture, auricular acupuncture interventions involving needle insertion during labor, and have objective and/or subjective pain-related outcome measures, ie, request for analgesics or epidural analgesia (EDA), request for any pharmacologic or nonpharmacologic analgesia, pain intensity assessed by parturient, and choosing acupuncture for any future labor. The control interventions were usual care only or placebo acupuncture. Data extraction and validation were carried out by using a predefined, standardized form by 2 independent reviewers who resolved differences by discussion. Quality of reporting was assessed on the 5-point Jadad scale.¹³ Taking account of the fact that it is virtually impossible for an acupuncturist to be blinded to the treatment, we used a modification of this scale.¹⁴ Points were awarded as follows: study described as randomized, 1 point; additional point for appropriate randomization method, 1 point; inappropriate randomization method, deduct 1 point; patient blinded to intervention (ie, control procedure was indistinguishable from real acupuncture), 1 point; assessor blinded to intervention, 1 point; description of withdrawals and dropouts, 1 point. The maximum points available were 5. Patient-blinding was assumed where the control intervention was indistinguishable from acupuncture, even if the word "blinding"

did not occur in the report. Point for assessor-blinding was only given if specified in the text. Trials with 4 or 5 points were considered high quality.

Statistical analysis was performed with Review Manager (RevMan 4.2.3, The Cochrane Collaboration) software. For dichotomous data, summary relative risks (RR) were calculated by using a fixed effects model. For continuous data, weighted mean differences (WMD) were calculated. 95% CI were used. Heterogeneity between trials was sought if applicable and mentioned where found. Pooled data analysis was limited to the percentage of patients using meperidine and EDA, and reanalysis of the data was performed if necessary.

Results

Figure 1 summarizes the results of our literature searches. Three RCTs were included with 496 parturients (Table I). Of the 496, 258 participants received acupuncture treatment in the intervention group and 238 participants acted as controls. Two RCTs compared manual acupuncture with conventional care,^{15,16} and 1 RCT compared manual acupuncture with placebo acupuncture.¹⁷ All were conducted in a hospital setting, 1 in Sweden and 2 in Norway. The methodologic quality was considered good: 3 points on the modified Jadad scale were given to 2 trials^{15,16} and 4 points to 1 trial.¹⁷ Table II shows the comparisons of the available data and meta-analyses for the request for meperidine and EDA. Tests for significance and, if applicable, heterogeneity among trials are also presented.

Nesheim et al¹⁵ conducted a randomized, unblinded trial in 198 healthy parturients. The acupuncture group who received individualized manual acupuncture (n = 106) was compared with the conventional care-only group (n = 92). Significantly fewer women in the acupuncture group requested meperidine compared with the conventional care group ($P < .0001$). With regard to the amount of meperidine given, there was no difference between groups (median 75 mg, range 25-100 mg in all groups). Significantly fewer parturients in the acupuncture group requested other analgesia (EDA, meperidine, nitrous oxide, and sterile water papules) compared with conventional care group (RR 0.81, 95% CI 0.69-0.96, $P = .01$). Of 103 parturients who had acupuncture treatment, 89 stated they would use acupuncture for their next childbirth. There were no significant differences in labor outcomes (ie, duration of labor, weight of infant, frequency of cesarean sections, and Apgar score). No noticeable adverse events were reported in the acupuncture group.

A randomized, nonblinded, controlled trial with 2 parallel groups was performed by Ramnerö et al¹⁶ in 90 parturients with uncomplicated births. Parturients were randomly assigned to either receive manual acupuncture

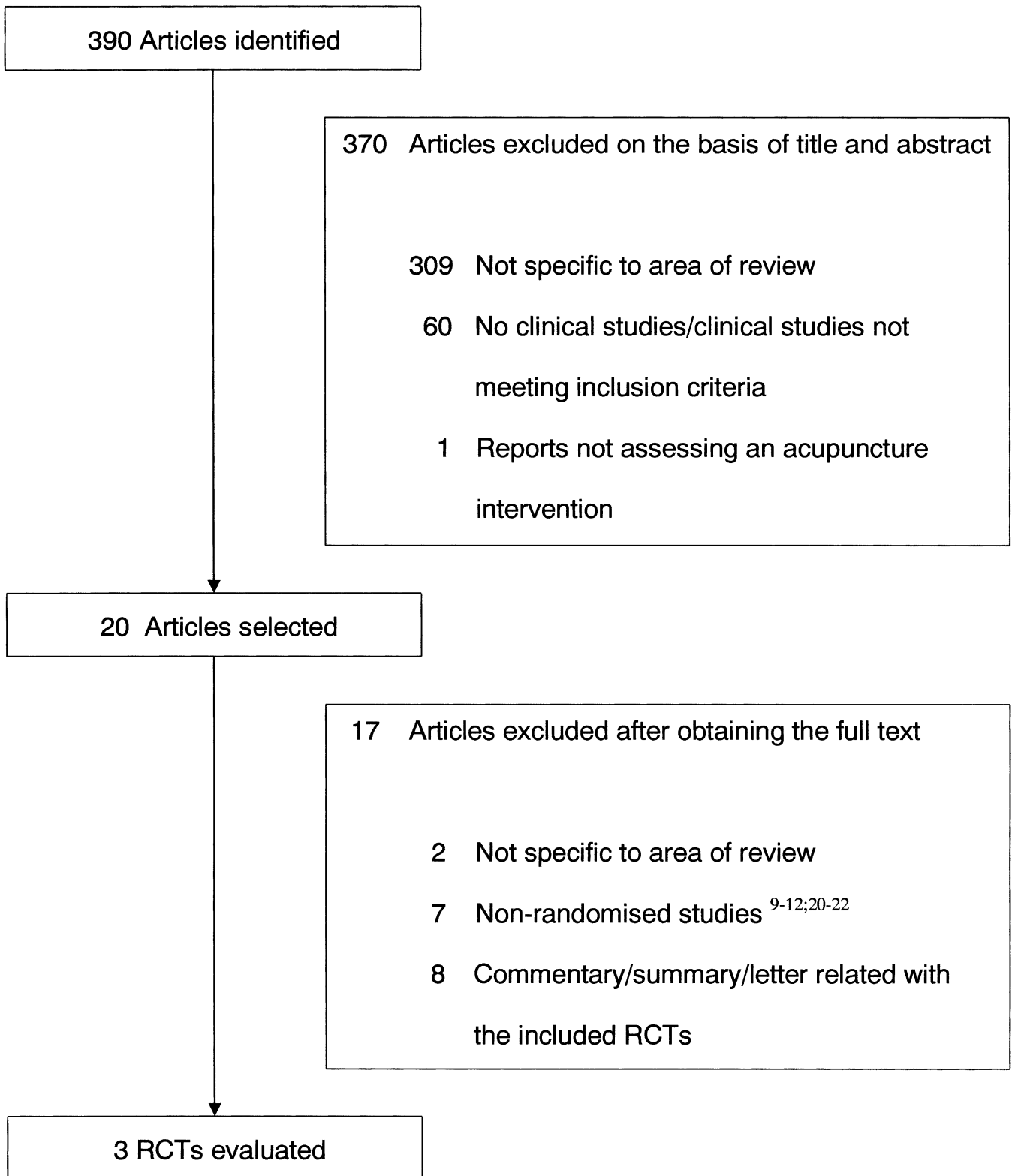


Figure 1 Flow diagram of literature searching.

Table I Summary of main features and outcomes of RCTs

Author (y)	Study design (Jadad score)	Groups and interventions	Outcome measures and results	Comments
Nesheim et al ¹⁵	Nonblinded, 3 arms (3)	Acup (n = 106): individualized MA De-Qi elicited Needles left for a few min or throughout delivery Con (n = 92): usual care	↓ % of pt using meperidine (11.32% vs 36.96%)* ↓ % of pt using any analgesia (66.04% vs 81.52%)* 86.41% of pt in acup group want acup for future labor	- ITT analysis - Matched-pair group; no difference from con
Ramnerö et al ¹⁶	Nonblinded, 2 arms (3)	Acup (n = 46): individualized MA De-Qi elicited Needles left for 1 to 3 h Con (n = 44): usual care	↓ % of pt using EDA (26.09% vs 50.0%)* No Δ pain on 11-point NRS No Δ % of pt using meperidine No Δ % of pt using other pharmacologic analgesia ↓ % of pt using TENS,* warm rice bag,** shower*	- ITT analysis - ↓ relaxation on 11-point NRS (4.2 vs 5.1)*
Skilnand et al ¹⁷	Placebo-controlled Pt-blinded, 2 arms	Acup (n = 106): individualized MA De-Qi elicited Taped needles left throughout delivery or until conversion to conventional analgesia, while untaped needles left for 10 min Average No. of needles 7 Con (n = 102): placebo acup non-acup points Superficial needling	↓ % of pt using meperidine (14.14% vs 35.29%)* ↓ % of pt using EDA (10.38% vs 26.47)** ↓ pain on 10 cm VAS* No Δ % of pt using nitrous oxide	- ITT analysis (implied)

Statistical significance criteria: * $P < .05$; ** $P < .01$; *** $P < .001$; **** $P < .0001$. Acup, Acupuncture; Con, control; ITT, intention-to-treat; MA, manual acupuncture; NRS, numeric rating scale ranging from 0 ("no pain") to 10 ("worst pain"); pt, patient; ↓, decrease; Δ, change. In none of the RCTs were adverse effects noted.

Table II Comparisons and outcomes for which there are data showing the effect size

Comparison and outcome	No. of studies	No. of participants		Pt with the event (%)	Effect size	Heterogeneity between trials (P value)
		Acup (n/N)	Con (n/N)	Acup vs Con	Statistical method = fixed [95% CI]; (P value)	
Acup vs con						
Pt using meperidine	3 ¹⁵⁻¹⁷	28/258	71/238	10.85 vs 29.83	RR = 0.36 [0.24-0.54] (< .00001)	.63
Pt using EDA	2 ^{16,17}	23/152	49/146	15.13 vs 33.56	RR = 0.45 [0.29-0.69] (< .0003)	.51
Acup vs conventional care						
Pt using meperidine	2 ^{15,16}	13/152	35/136	8.55 vs 25.74	RR = 0.32 [0.18-0.58] (.0001)	.43
Pt using EDA	1 ¹⁶	12/46	22/44	26.09 vs 50.00	RR = 0.52 [0.30-0.92] (.03)	—
Acup vs placebo acupuncture						
Pt using meperidine	1 ¹⁷	15/106	36/102	14.15 vs 35.29	RR = 0.40 [0.23-0.69] (.0009)	—
Pt using EDA	1 ¹⁷	11/106	27/102	10.38 vs 26.47	RR = 0.39 [0.21-0.75] (.005)	—

Significant differences: $P < .05$, in bold. Acup, Acupuncture; con, control; n/N, number of patients with the event/total number of patients.

(n = 46) or usual care only (n = 44). The 11 participating midwives had attended a 4-day course in basic and theoretic concepts of acupuncture for labor pain, and had been offering acupuncture treatment in the labor ward for about 1 year. All patients had access to

all conventional analgesic methods available at the delivery ward, including nonpharmacologic approaches (ie, transcutaneous electrical nerve stimulation [TENS], warm rice bag, bath/shower, and intracutaneous injections of sterile water) and pharmacologic treatments

(ie, nitrous oxide, EDA, meperidine, and paracervical nerve block). Compared with the control group, the acupuncture group requested significantly less EDA (RR 0.52, 95% CI 0.30-0.92, $P = .03$). Maternal pain relief and the request for other pharmacologic analgesia, including meperidine, were not different between groups. Parturients receiving acupuncture, however, reported a significantly higher degree of relaxation (WMD -0.90 , 95% CI -1.62 to -0.18 , $P = .01$). Significantly fewer patients in acupuncture group requested other nonpharmacologic analgesia, ie, TENS (RR 0.03, 95% CI 0.00-0.54, $P = .02$), warm rice bag (RR 0.29, 95% CI 0.14-0.61, $P = .001$), and shower (RR 0.21, 95% CI 0.05-0.93, $P = .04$). Acupuncture was not associated with adverse events.

In a placebo-controlled, subject-blinded trial by Skilnand et al,¹⁷ parturients were randomly allocated to either receive acupuncture ($n = 106$) or placebo acupuncture ($n = 102$; ie, superficial needling on non-acupuncture points). Although an attempt was made to mask the assessor, this was not consistent, so the point for assessor-blinding was not given on the modified Jadad scale.¹⁴ The analgesic effect of acupuncture was assessed by using parturients' reporting of pain on a visual analog scale (VAS) and the number of patients who requested pethidine and EDA. The average VAS score of the acupuncture group was significantly lower than that of the placebo group, at 30 minutes, 1 hour, 2 hours after acupuncture, and 2 hours post partum ($P < .05$). There was significantly less request for both EDA ($P = .005$) and pethidine ($P = .0009$) in parturients who received acupuncture treatment than in those in the placebo group. Parturients in the acupuncture group showed significantly shorter duration of labor (WMD -71.00 , 95% CI -123.70 to -18.30 , $P = .008$), but the difference was no longer significant after exclusion of patients using EDA. The need for oxytocin augmentation was significantly less in the acupuncture group (RR 0.40, 95% CI 0.23-0.69, $P = .0009$). No adverse events of acupuncture were noted.

Comment

Overall, the evidence of acupuncture for pain management during labor is encouraging. The methodologic quality of the primary studies is generally good, and collectively these data suggest that acupuncture alleviates labor pain and helps reduce analgesic consumption. Its analgesic effect seems to be superior to placebo acupuncture, but data are limited.

Despite the increasing use of acupuncture,^{18,19} the number of RCTs available for this systematic review is small. All the studies were published between 2002 and 2003. Previous publication on this subject consisted of retrospective studies, and case series or reports.^{9-12,20-22} The advent of rigorous research in this area is welcome.

A number of weaknesses with the original RCTs must be noted. We adopted the modified Jadad scale where a point is awarded for patient-blinding and for assessor-blinding, respectively.¹⁴ Of the three RCTs, 2 made no attempt at either subject or assessor-blinding. Lack of blinding or inadequate blinding can cause an overestimation of the treatment.²³ Therefore, the positive conclusions of these studies may be overoptimistic.^{15,16} Placebo or sham acupuncture interventions include minimal acupuncture and sham needle devices that mimic acupuncture stimulation without inserting needles into skin.²⁴ The only placebo-controlled trial in this review is also not flawless: the credibility of the placebo was monitored retrospectively in only 8 parturients from each group.¹⁷ Although there are some practical difficulties such as recruiting acupuncture-naive parturients and training acupuncturists or midwives to perform indiscernible intervention with a sham needle device, rigorous trials adopting an appropriate placebo control will be helpful in answering the age-old question whether acupuncture generates more than a placebo response. The only placebo-controlled trial¹⁷ also attempted to mask the assessor but this does not seem to have been maintained throughout the trial: thus, the 1 point for assessor-blinding on the modified Jadad scale¹⁴ was not given. In all 3 RCTs, midwives who were the main care providers also performed acupuncture treatment. Assessor-blinding, however, is essential in principle so as to minimize measurement bias. If it is considered impracticable, to include blinded third-party assessor during delivery, at least the data evaluator should be masked.²⁵

The choice of outcome measure is another important determinant of study quality. All 3 RCTs reported the request for meperidine and EDA as an objective measure of pain and 2 studies also assessed maternal pain relief on a VAS¹⁷ or a numeric rating scale¹⁶ as subjective outcome measures of pain. Previous studies have demonstrated a discrepancy between the labor pain perceptions of patients and the pain assessments by midwives or physicians.^{26,27} An optimal way of quantifying analgesic effects of interventions with potentially powerful placebo effects, would be to include both subjective and objective measures of pain. The trial by Ramnerö et al¹⁶ was successful in reducing the request for EDA by about 50%, but in the subjective pain assessment on a numeric rating scale, no intergroup difference emerged. In 1 study in which only objective outcome measures of pain were used, acupuncture reduced the request for meperidine but it is not clear whether the request for EDA was also significantly diminished.¹⁵ Only 1 RCT showed a consistent analgesic effect of acupuncture assessed by patient and midwife.¹⁷ This study constitutes the best evidence to date of an analgesic effect of acupuncture.

Although all 3 RCTs arrive at positive conclusions regarding the analgesic effects of acupuncture for labor pain, further trials are required to confirm or refute the

effectiveness of this approach. One noticeable finding was that parturients who received acupuncture reported a significantly higher degree of relaxation.¹⁶ As this trial was not blinded in any way, the finding could be unrelated to specific effects of acupuncture. An interesting research question for future trials could be to test whether the acupuncture primarily causes relaxation and as a consequence reduces pain or vice versa.

Safety issues of an intervention are important for estimating its risk-benefit profile. Serious adverse events of acupuncture are on record²⁸ but infrequent, provided that it is practiced according to established safety rules in appropriate anatomic regions. Nonserious adverse effects such as mild pain or bleeding are reported in about 7% of all cases.^{29,30} Similarly, one might be concerned about the extra cost of acupuncture. At present no conclusive cost evaluations of acupuncture for labor pain are available. Generally speaking, however, prospective economic evaluations of complementary therapies suggest that they would incur additional cost rather than cost savings.³¹

Acupuncture's mode of action is not well established. In the West, acupuncture is best known for its analgesic effects.³² There are differences in the concepts of pain between traditional Chinese medicine and conventional Western medicine. In traditional Chinese medicine, pain is believed to be caused by a stagnation of Qi.³³ In Western medicine, the mechanism whereby acupuncture works is believed to be neurohumoral.^{34,35} In addition, a range of investigations have proposed different mechanisms of acupuncture analgesia (eg, different modes of neuronal activation by acupuncture)^{36,37} and intramuscular stimulation for pain relief on the basis of the radiculopathy model.^{38,39} Despite these laboratory findings, the scientific basis of acupuncture analgesia remains hypothetical,⁴⁰ and its clinical value in pain control is still controversial.^{1,32} Good evidence for its effectiveness exists in acute dental pain,³ low back pain,⁴ and recurrent headache,⁶ whereas the evidence is inconclusive for fibromyalgia⁴¹ and neck pain.¹⁴ In obstetrics and gynecology, acupuncture is often used for dysmenorrhea, nausea and vomiting during pregnancy, breech version (moxibustion), labor induction, and analgesia,^{7,8} but the evidence is limited both in quantity and quality.

Our systematic review has several important limitations. Even though our search strategy was thorough, we cannot be absolutely sure that all RCTs were located by it. Given the small number of studies included, even 1 additional RCT could change the conclusion considerably. The paucity of primary studies, of course, renders any conclusions less certain than one would hope them to be. All systematic reviews are vulnerable to publication bias (eg, the tendency of negative trials remaining unpublished). If publication bias has prevented negative trials to be included in our review, our conclusions might be overoptimistic.

We tested possible statistical heterogeneity between trials. Statistical heterogeneity may be caused by known clinical or methodologic differences between trials, or may be related to unknown trial characteristics. Non-significance of the test of heterogeneity can never be interpreted as evidence of homogeneity of the results of the included trials as tests of heterogeneity have low power and may fail to detect even a moderate degree of genuine heterogeneity as statistically significant.⁴² For policy recommendations, a large number of acupuncture trials would be needed to investigate potential sources of heterogeneity.

In conclusion, the collective data from RCTs suggest that acupuncture alleviates pain and reduces analgesic consumption during labor. One RCT suggests that real acupuncture is more effective than placebo acupuncture for this indication. Mainly because of the paucity of primary studies in this area, the effectiveness of acupuncture remains uncertain. Further research is required to establish the value of acupuncture as an adjunctive treatment during labor.

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