

## **BRIEFING PAPER No 12**

# **OBSTETRICS (2)**

## **PREGNANCY and LABOUR**

The evidence for the effectiveness of  
**ACUPUNCTURE**

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Written by **Sarah Budd**

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The Evidence Series of Briefing Papers aims to provide a review of the key papers in the literature, which provide evidence of the effectiveness of acupuncture in the treatment of specific conditions. The sources of evidence will be clearly identified ranging from clinical trials, outcome studies and case studies. In particular this series of briefing papers will seek to present, discuss and critically evaluate the evidence.

# **ACUPUNCTURE IN PREGNANCY AND LABOUR**

## **THE EVIDENCE FOR EFFECTIVENESS**

### **SUMMARY**

This paper presents a summary of the evidence for the effectiveness of acupuncture in the treatment of pregnancy-related conditions and other uses in obstetrics. The majority of the articles reviewed relate to pain relief in labour (22 studies) and induction/ duration of labour (13 studies). Others cover various conditions of pregnancy such as backache, pelvic pain, or breech presentation. There is a wide variability in the type of acupuncture and methodological design making it difficult to compare studies and develop overall conclusions. Nevertheless the available sources provide some evidence that acupuncture is an effective treatment for these conditions.

### **INTRODUCTION**

Obstetrics is defined as the science of midwifery, that is to say, assistance at childbirth. There are reports in the ancient texts of acupuncture being used to aid childbirth at least as far back as the Jin Dynasty (265-420) (Zheng, 1990).

In theory, acupuncture is ideally suited to obstetrics. There are restrictions on the use of drugs during pregnancy which may have harmful, teratogenic effects on the foetus. This has meant there was little to offer women for the minor ailments of pregnancy, which in some cases can be quite severe, even needing hospitalisation. Acupuncture has been used to treat a long list of conditions including morning sickness, migraine, backache and constipation. It has also been used to encourage version of the foetus in breech presentation, induction of labour, and pain relief in labour. After the birth it may be used to treat haemorrhoids, mastitis, depression and other problems associated with this period.

As "obstetrics" is not in itself a condition needing treatment, this paper relates to the disorders and complications of pregnancy. **(For pregnancy sickness, see Briefing Paper 10, Obstetrics (1)).**

Due to the wide variability and number of studies, the main features of the studies are presented in table form.

Studies that have been added since the original version of this briefing paper are as follows: Habek et al (2003) and (Neri et al 2004, 2007) on breech presentation; Elden et al (2008 x3) on pelvic pain; Martensson et al (2008), Fan Qu and Jue Zhou (2007), Ziaei and Hajipour (2006), Borup et al (2009), Hantoushzadeh et al (2007) and Citkovitz et al (2009) on pain relief in labour; Harper et al (2006) and Gaudernack et al (2006) on augmentation of labour; Guerreiro da Silva (2007) on emotional complaints in pregnancy; and reviews by Betts (2006), Ee et al (2008), Coyle et al (2007), Van den Berg et al (2008), Lee and Ernst (2004), and Smith and Crowther (2007).

Many of the reviews from the original version, superceded by more recent ones, have been discarded:

Chez and Jones (1997), Beal (1999), Allaire (2001), Gentz (2001), Ewies and Olah (2002), Young and Jewell (2002), Fugh-Berman and Kronenberg (2003).

## **LITERATURE SEARCH**

A search was made using the ARRC database, as well as further searches on AMED, BNI, EMBASE, NHS EVIDENCE, MEDLINE, CINAHL AND COCHRANE databases, using the key words "pregnancy (+obstetric etc), labour, induction", plus "acupuncture".

Additional articles were obtained through cross-referencing the literature cited in individual studies and reviews. After excluding those in a foreign language, and letters and commentaries, there were 54 original clinical studies remaining, plus 8 review papers. Various different types of methodology are represented in the studies: randomised controlled trials, case series, case reports and observational studies.

## **MALPOSITION AND BREECH PRESENTATION**

### **Refer to table 1.**

Of the ten studies reported, eight used a control group, either no intervention<sup>8,9,26,31,35,42</sup> or the standard knee-chest position<sup>47</sup> or sham acupuncture<sup>41</sup>. One case series<sup>7</sup> showed a 61% success rate in fetuses turning to cephalic presentation. The remaining study<sup>43</sup> compared the cardiovascular effects and fetal behaviour during three alternative treatment approaches: moxibustion, acupuncture or acupuncture plus moxibustion applied to point Bl67 for breech presentation. Version to cephalic presentation occurred in 56% of cases; of these, 80% for moxibustion, 28% for acupuncture and 57% for acupuncture plus moxibustion.

The controlled studies comprised four randomised trials (RCTs)<sup>9,26,35,42</sup>, one cross-over<sup>41</sup> and three with non-randomised matched groups<sup>8,31,47</sup>. The interventions were variously moxibustion, acupuncture, combined acupuncture and moxibustion, electro-acupuncture (EA) or auricular seed pressing. All showed significantly positive effects except for the EA group in one study<sup>31</sup>. (In this large retrospective case control the moxibustion and EA groups produced very similar results, 92% and 89% version, but their respective controls differed by 10%: 73% and 83%. Hence the moxa intervention was deemed effective but not the EA. The apparent distinction may be no more than a chance sampling effect). The small cross-over study<sup>41</sup> was notable in that the outcomes were changes in foetal heart rate and foetal movements rather than simply turning/not turning.

*One further study has been published by Cardini and co-workers<sup>10</sup>. As this trial was interrupted with fewer than half the patients recruited it has not been summarised here.*

## **BACK AND PELVIC PAIN**

### **Refer to table 2.**

Of seven studies in this category, four<sup>17,20,24,65</sup> were controlled trials, two<sup>22,58</sup> were single case reports and one<sup>57</sup> a retrospective case series. In three of the controlled studies acupuncture was significantly more effective than medication<sup>24</sup>, physiotherapy<sup>65</sup> or exercises<sup>17</sup>. All showed a positive outcome for acupuncture though there were wide variations in the nature and frequency of the treatment.

The only study<sup>17,18</sup> which followed up patients in the post-natal period found approximately three-quarters of women were free of pain 3 weeks after delivery and 99% 12 weeks after. There were no differences in recovery between the 3 treatment groups. The same author<sup>19</sup> later reported on adverse effects of standard treatment, acupuncture and stabilising exercises in his previous study and found that there were no serious events after any of the treatments and only minor adverse complaints from the acupuncture group (who received strong needle stimulation) with women rating acupuncture favourably despite this. There were no observable severe adverse influences on the pregnancy, mother, delivery or the fetus/neonate.

This same author<sup>20</sup> went on to publish a paper comparing acupuncture with non-penetrating sham acupuncture. This showed acupuncture had no significant effect on pain or on degree of sick leave compared with controls but there was some improvement in performing daily activities. Interestingly, de qi was reported in 93% of the acupuncture group and 28% of the sham group! The authors felt this may be due to the sham treatment not being totally inert. There were baseline differences in numbers on sick leave, therefore resting (more for the sham group), which may have biased the trial results. Most women with pelvic pain in pregnancy find that their pain improves when they stop work and rest more.

## **PAIN RELIEF IN LABOUR**

### Refer to table 3

Eight articles refer to uncontrolled case series and in all of these<sup>1,30,34,40,46,61,66,67</sup> there were success rates (i.e. adequate pain relief achieved) of 56-92%.. Of the eight, five used only EA, one used EA plus MA, one MA plus moxibustion and one EA or MA. In this last there was 60% success with EA but 0% with MA. Hence in none of these studies was MA alone shown to be effective.

In one of the controlled trials<sup>63</sup> only 10% of patients reported adequate analgesia though this was set up primarily to compare manual acupuncture (MA) and EA.

For the other sixteen controlled trials nine were RCTs and the rest were contemporaneous or retrospective matched controls. In contrast to the case series most of them used MA. Seven<sup>6,27,44,49,55,56,69</sup> out of sixteen found acupuncture reduced the need for conventional medication and four<sup>21,45,50,51</sup> showed a reduced pain rating (though Ramnero et al<sup>49</sup> achieved fewer epidurals without changing pain ratings and Ziaei and Hajipour<sup>69</sup> similarly found no significant differences in pain rating but less medication required by the acupuncture group). Five<sup>13,38,39,54,68</sup> found no significant differences in analgesic requirements between the acupuncture and control groups but most of them provided only weekly treatments from week 35 or 36 until delivery rather than intensive acupuncture during labour itself.

Five RCTs on pain relief in labour have been added to this update. One trial<sup>69</sup> using acupuncture on a small group of women during labour found no significant differences among the groups in pain and relaxation score, duration of labour or caesarean section rate but fewer women needed augmentation (increasing or enhancing contractions with an intravenous infusion of the hormone “Syntocinon”, a synthetic form of oxytocin) in the acupuncture group than the two control groups.

One study<sup>21</sup> compared an electro-acupuncture group to a control group that had no pain relief. Beta-endorphins and 5HT levels were compared and found to be significantly higher in the acupuncture group which also recorded lower pain intensity and better relaxation.

A study on the effects of acupuncture during labour on nulliparous (first baby) women<sup>27</sup> found pain scores reduced more with real than sham acupuncture though differences in baseline levels could have biased the results. The main finding of this study was a reduction in duration of active phase and less need for oxytocin augmentation. There was a high willingness to use acupuncture again (95%) in the study group.

More recently, one prospective RCT<sup>39</sup> compared acupuncture with subcutaneous injections of sterile water as treatment for labour pain. There were no significant differences regarding the need for additional pain relief, and women given sterile water injection experienced less labour pain compared to women given acupuncture. (*This technique is used in Scandinavian countries, the USA and Canada*).

The largest RCT to date<sup>6</sup> compared acupuncture to TENS and traditional analgesia. They also looked at birth experience and obstetric outcome. Use of pharmacological and invasive methods was significantly lower in the acupuncture group, mean Apgar scores and cord blood pH (indicators of fetal wellbeing) were significantly higher in the acupuncture group.

A recently published case- controlled pilot study<sup>13</sup> found the acupuncture group had significantly fewer caesarean sections (7% vs 20 %  $p = 0.004$ ) This involved a small sample size but at a time when there is a strong move to try and reduce Caesarean rates this is an important finding. No significant differences were noted in other clinical endpoints but 87% of patients reported that acupuncture had helped them.

Given the substantial increase in evidence from RCTs in the last few years it is useful to summarise their results as a separate group in more detail. Four<sup>21,44,45,49</sup> of the nine RCTs **compared acupuncture to no (additional) intervention**; the numbers of subjects ranged from 36 to 200; three were wholly positive and one partly positive for acupuncture in respect of the primary outcomes. Three<sup>27,51,69</sup> **compared acupuncture to sham acupuncture**; the numbers of subjects ranged from 90 to 210; two were positive and one partly so. Two<sup>6,39</sup> **compared acupuncture to other interventions**; the numbers of subjects were 128 and 607; one was positive (v. TENS or traditional analgesia) and one negative (v. sterile water).

## **INDUCTION OF LABOUR and DURATION OF LABOUR**

### **Refer to table 4.**

Four case series<sup>34,59,60,67</sup> used EA and successfully **induced** 66-100% of women at term. Acupuncture was much less effective pre-term and for mid-term abortions<sup>34,60</sup>. By contrast, **inhibition** of early labour may be possible<sup>60</sup>. The other two case series showed that acupuncture could reduce the duration of labour, measured as either induction to delivery interval<sup>46</sup> or the speed of cervical dilation (an increase in which was also associated with more intense and frequent contractions)<sup>36</sup>.

Three controlled trials on induction of labour produced positive results for acupuncture compared with no treatment. In one<sup>33</sup> all 35 women having EA started contractions within 25 minutes, and they were stronger and more frequent. In the second,<sup>38</sup> success was measured by cervical ripening and in the time between due date and delivery. The third and more recent study<sup>28</sup> found mean time to delivery to be 21 hours sooner in the acupuncture group and Caesarean section was less likely. As stated above, any data on reduction of Caesarean rates at this time is welcome to all professionals, regulators and legislators and of course patients and will hopefully inspire further studies in this area.

Eight<sup>23,27,32,45,50,51,54,68,69</sup> out of ten controlled trials have shown acupuncture to decrease length of labour, though in two of these this was only for primiparous women. By contrast Lyrenas et al<sup>37</sup> found no such reduction and indeed longer gestations. In her recent review<sup>5</sup> Betts discusses some possible reasons for these anomalous results. Ziaei<sup>69</sup> found no significant effect on overall duration or the lengths of the different stages.

Again, faster cervical dilation in the first stage of labour was found to be associated with increases in both intensity and frequency of contractions<sup>33</sup>. One of the most recent studies<sup>23</sup> was

on augmentation after spontaneous rupture of membranes at term and found a significant reduction in duration of labour and need for Oxytocin.

## **MISCELLANEOUS CONDITIONS**

### **Refer to table 5.**

One report<sup>11</sup> refers to acupuncture for placental retention, with a positive outcome compared to the control group. Another<sup>64</sup> is not a specific study but a status report on the use and effectiveness of acupuncture analgesia for Caesarian Section in China during the 1970s and 80s. A third study<sup>25</sup> compared acupuncture to counselling and psychotherapy for women with mild to moderate emotional complaints in pregnancy with a positive outcome for the acupuncture group.

## **REVIEWS**

### **General**

**Swan and Cook<sup>53</sup>(2003)** reviewed acupuncture in obstetric care and concluded that “the available evidence is not of sufficient strength or quality to support the widespread introduction of acupuncture into obstetrics under the banner of evidence- based practice.”

**Betts<sup>5</sup> (2006)** discussed selected acupuncture studies for pelvic pain, morning sickness, breech presentation, cervical ripening and pre-birth acupuncture. She wrote primarily from the perspective of an experienced user and teacher of traditional acupuncture, and a midwife, rather than from that of a medical researcher. Hence she was able to point out the possible benefits of research to the profession, as well as the dubious procedures that have been employed in some of the study protocols.

### **Back and pelvic pain in pregnancy**

**Ee et al's (2008)** systematic review<sup>16</sup> of acupuncture for back and pelvic pain in pregnancy included two small trials and one large trial. Acupuncture as an adjunct to standard treatment was superior to standard treatment alone and physiotherapy in relieving mixed back/pelvic pain. However, they concluded that limited evidence supported acupuncture in treating this condition and that additional high quality trials were needed to test the existing promising evidence.

### **Breech presentation**

**Coyle et al's (2007)** systematic review<sup>14</sup> of cephalic version by moxibustion for breech presentation included three trials involving a total of 597 women. The authors concluded there was insufficient evidence to support the use of moxibustion to correct a breech presentation, but it may be beneficial in reducing the need for ECV (external cephalic version) and decreasing the use of oxytocin before or during labour. Again there was a call for well-designed trials to properly evaluate this technique.

**Van den Berg et al's (2008)** systematic review<sup>62</sup> looked at controlled trials on acupuncture-type interventions for breech presentation, including moxibustion, acupuncture or electro-acupuncture to point BL67, compared to expectant management. Six RCTs and three cohort studies were included in the review. They concluded that acupuncture type interventions were effective compared to expectant management, but that as some studies were of inferior quality, further RCTs of improved quality were needed.

### **Induction of labour**

**Smith and Crowther<sup>52</sup> (2007)** reviewed acupuncture for induction of labour, but found only one trial of 56 women which met the inclusion criteria. They therefore concluded that there was a need for well-designed RCTs in this area and for trials to assess clinically meaningful outcomes.

### **Pain relief in labour**

**Huntley et al's (2004)** systematic review<sup>29</sup> of complementary and alternative medicine (CAM) for labour pain, included only prospective randomised controlled trials. There were two on acupuncture meeting these criteria. Both scored 3 out of a possible 5 on the Jadad scale (for assessing methodological rigour) because of lack of double blinding. Although pain ratings were not greatly improved, the results suggested receiving a physical intervention like acupuncture does have an influence on a woman's pain management during labour. Again they stated that more research is warranted.

**Lee and Ernst<sup>70</sup> (2004)** conducted a systematic review on acupuncture for labour pain and included three RCTs, all of good quality and comprising 496 participants. They concluded that the evidence for the use of acupuncture as an additional method of pain relief is promising, but that further research is warranted owing to the limited amount of data available.

## **FORBIDDEN POINTS**

Although these are not research papers, it is important to mention the literature that exists on this topic.

There are some who prefer not to treat women in pregnancy with acupuncture, and this is often due to concerns over the safety aspects in relation to the so-called "forbidden points". Detailed discussion on this is beyond the remit of this briefing paper, but the reader may like to refer to articles such as those by Dale <sup>15</sup>(1997), Chen <sup>12</sup>(1998), Forrester <sup>22</sup>(2003) or Betts <sup>4</sup>(2005).

## **CONCLUSION**

The majority of these studies show positive outcomes for acupuncture treatment of various conditions in pregnancy and labour. Despite the methodological deficiencies in many of the studies the verdict of the review papers seems over-cautious. Of the 34 controlled trials presented here (excluding two that just compared different types of acupuncture), only 5 did not produce



positive results (in at least one of the primary outcomes) for acupuncture – though the size and significance of the benefit is still to be determined. There is a great difference in the choice of points, methods of stimulation and duration of treatment: further studies would be required before specific treatment protocols could be recommended.

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# Tables of acupuncture studies in obstetrics

Numbers in brackets below the author details are the reference list numbers, for ease of matching the text summaries to the table entries.

## 1. BREECH PRESENTATION

STUDY	TRIAL DESIGN	N0.	ACUPUNCTURE TREATMENT	CONTROL	TREATMENT AMOUNT	RESULTS
Cardini 1991 [7]	Case Series	33	Moxibustion to Bl67	None	30 minutes daily for 15 days	61% success rate
Qin and Tan 1989 [47]	Case series with matched control group	413	Ear seeds to 7 auricular points. 3 groups at different gestations	Knee-chest position for 40 patients	Seeds stimulated pre-prandially for 4 days. Repeat once more if ineffective	Significant difference in version at all 3 gestations compared with control
Cardini 1993 [8]	Clinical study with retrospective control matched for parity and gestational age.	23	Moxibustion to Bl67	Routine care with no intervention	Daily for minimum 5 days	Significantly higher version rate in study group compared to control.
Li and Wang 1996 [35]	Randomised controlled.	111	Electro-acupuncture or moxibustion to Bl67.	No treatment	Daily until correction for up to 6 days	81% in electro- group 75% in moxibustion and 16% control( $p<0.005$ between electro and control)
Cardini 1998 [9]	Randomised, controlled.	260	Moxibustion to Bl67	Routine care with no intervention	Daily for 7 days plus 7 days if still breech	75.% cephalic at 35 weeks v 48% of controls ( $p<.001$ ) 75% cephalic at birth v 62%, but 24 in control group had External Cephalic Version

Kanakura et al. 2001 [31]	Matched retrospective control groups – one for each of 2 interventions	765	Moxibustion or electro-stimulation to Bl67, Sp6, Kid1.	No intervention.	Daily for 30 minutes until correction or until deemed non-responsive	92% moxibustion group turned to cephalic, 73% in controls ( $p<0.0001$ ). In electro group, 89% vs 83%
Neri et al 2002 [41]	Single- blind cross-over design. Sham acupuncture followed by true, 1-2 days later	12	Acupuncture and moxibustion bilaterally to Bl67.	Minimal (sham) acupuncture	20 minutes per session, twice per week, up to 5 sessions if required	Reduction in foetal heart rate and increase in foetal movements with true acupuncture. No significant changes in control
Habek et al 2003 (26)	Randomised, controlled	67 34 acup 33 control	Manual acupuncture to Bl67	No Intervention	30 minutes per day twice a week from 34 weeks. Mean of 6 acup treatments	76.4% version in acup group vs 45.4% controls ( $p=0.001$ )
Neri et al. 2004 (42)	Randomised, controlled	226 112 acup 114 control	Bilateral acupuncture PLUS moxibustion to Bl67	No intervention	Needles in situ with De Qi plus continuous moxibustion for 20 minutes, twice weekly for 2 weeks.	53.6% version in acup group vs 36.7% controls, ( $p=0.001$ ) Caesarean section rate 52.3% acup vs 66.7% controls. ( $p=0.03$ )
Neri et al 2007 (43)	3-group comparison: moxibustion, acupuncture or acupuncture + moxa	39 15 moxa, 10 acup, 14 bothp	Bilateral acupuncture to Bl 67, or bilateral with moxa or bilateral moxa alone.	Comparison of 3 different acu-moxa interventions	20 minutes per session twice weekly with testing 20 mins before, during and after treatment.	80% version for moxa alone, 57% for acupuncture plus moxa and 28% for acupuncture alone. Moxa alone affected fetal movements, acup plus moxa reduced fetal heart rate and movements.



## 2. BACK AND PELVIC PAIN IN PREGNANCY

STUDY	TRIAL DESIGN	NO.	ACUPUNCTURE TREATMENT	CONTROL	TREATMENT AMOUNT	RESULTS
Thomas & Napolitano 2000 <i>Pelvic</i> [58]	Case report	1	Auricular to Shenmen, Sympathetic, Abdomen 2 and Lumbar vertebrae.	None	Needles retained for 8 hours, 5 times in 1st week, then twice weekly until delivery	Discharged from hospital after 4 <sup>th</sup> treatment and much less narcotic analgesia needed
Ternov et al 2001 <i>Both</i> [57]	Retrospective case series	167	Various points, for 45 minutes, stimulated at 15 minute intervals	None	Variable	Good or excellent analgesia in 72% of patients
Forrester 2003 <i>Back</i> [22]	Case Report	1	Various points at each treatment	None	7 treatments over 9 week period	Pain rated 20-55 pre-acup. and 5-10 after (by VAS)
Wedenberg et al. 2000 <i>Both</i> [65]	Randomised controlled.	60	Acupuncture to ear points followed by various body points when needed	Physiotherapy	3 times weekly for 2 weeks, then twice a week, total of 10 treatments in 1 month	VAS values better after acup than physio in morning ( $p<.02$ ) and evening ( $p<.01$ ). Disability rating index significantly better in acup group only
Guerreiro da Silva et al 2004 <i>Back</i> (24]	Prospective, quasi-randomised, controlled	61 (27 acup 34 control)	Various points based on TCM and individualised	Standard treatment with Paracetamol and Hyoscine	Mostly once weekly, twice if severe, over 8 weeks.	Pain reduction 4.8 points in acupuncture group vs -0.3 control ( $p<0.0001$ )

Elden et al 2005 <i>Pelvic</i>  [17]	RCT, single blind Acup or exercise as adjuncts to standard therapy	386 (125 acu 130 exer 131 std)	a) local points (segmental & extra-segmental) – by ahshi & pain diagnosis b) general pain-relieving points (unspecified)	1) Std therapy (information, advice, pelvic belt, home exercises) 2) Standard plus stabilising exercises	Twice a week for 6 weeks	Acup group had largest improvement in pain intensity – both self- & independently assessed. (Most outcomes statistically significant)
Elden et al 2008 <i>Pelvic</i>  (20)	RCT, double blind. 1. Standard treatment plus acup or 2. standard plus non-penetrating sham acup	115 58 in group 1, and 57 in group 2.	Unclear from paper but included trigger points and a selection of points including LI4, Bl 32,33, Kid 11 - considered by some to be forbidden at this stage in gestation (12-29 weeks)	Sham needling.	12 treatments of 30 mins each, manually stimulated every 10 mins to evoke de qi, twice weekly for 4 weeks and weekly for 4 weeks.	No significant effect on pain ( $p=0.493$ ) . Acupuncture group in regular work more ( $p=0.041$ ) and had superior ability to perform daily tasks on DRI <sup>1</sup> ( $p=0.001$ ) De Qi reported in <b>28%</b> of sham group!

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<sup>1</sup> DRI = disability rating index

### 3. PAIN RELIEF IN LABOUR

STUDY	TRIAL DESIGN	N0.	ACUPUNCTURE TREATMENT	CONTROL	TREATMENT AMOUNT	RESULTS
Abouleish & Depp 1975 [1]	Case series	12	Electro-acupuncture to various points, usually 8 for each patient.	None	Continuous	66% experienced relief of pain, but comment made on impracticality.
Ledergerber 1976 [34]	Case series	20	Manual or electro-acupuncture to St44, St36, Sp6 and others	None	[Not clear in paper]	9 cases with electro-acup successful, 6 not. None in manual group successful.
Hyodo and Osamu 1977 [30]	Observational study	32	Electro-acupuncture to St36, LI4 and Sp6	None	Continuous from early labour until 3rd stage of labour	Definite subjective and objective relief of pain in 60% of primiparas and 90% of multiparas after acupuncture.
Perera 1979 [46]	Case series	60	Acupuncture to Du20, LI4, St44, Bl67 all on left side only. Electro to Neima (ex) and Sp6 only	None	Continuous	92% effective. Induction to delivery interval also shortened.
Umeh. 1986 [61]	Case series	30	Sacral acupuncture to Bl32 with manual stimulation and moxibustion	None	[Not stated in paper]	63% had adequate pain relief on VAS, with 31% of these reporting no pain at all in average 8 hours of labour.
Yanai et al. 1987 [66]	Observational study	16	Electro-acupuncture to LI4 and ear Shenmen	None	At start of active stage of labour	56% mild to good pain relief by patient assessment. Midwives assessed it as 94% and physicians

						87%.
Martoudis & Christofides 1990 [40]	Observational study	168	Electro-acupuncture to LI4 and ear Shenmen bilaterally for 20 or 30 minutes	None	Dependent on duration of labour	Slight to very good benefit in 88% of cases, "failure rate" 12%.
Yip et al, 1976 – see section 5 – women treated with acupuncture needed less analgesia than usual [67]						
Wallis et al 1974 [63]	Comparison between manual and electro-acupuncture	21	Points according to TCM diagnosis	Electro versus manual acupuncture	According to patient request for analgesia	19 out of 21 reported inadequate analgesia
Pei and Huang 1985 (45]	Randomised controlled	200 (100 acup 100 control)	Electro-acupuncture to either B132 or special local point or combined B132, Sp14 and St30 .	No intervention	Continuous	94-97% in treatment group had adequate analgesia vs 0% in control group, and acupuncture group had shorter course of labour.
Skelton and Flowerdew 1988 [50]	Non-randomised, controlled	170	Electro-acupuncture to Sp6, St36 and Neima (ex).	Conventional analgesia.	Continuous until delivery. Entonox also available.	Only multiparous patients had less pain. Significantly shorter first stage for primigravids than control.
Lyrenas et al. 1990 [38]	Contemporaneous matched control group.	32	Acupuncture to St 36, GB34, Sp6 and Bl62 bilaterally	No intervention	Once weekly until delivery from 36 weeks and for 30 mins each time	No lessening of labour pain, nor reduction in analgesic requirements, with acupuncture
Ternov et al	Contemporan-	180	Individualised to a variety of	No	Variable but mostly	Standard analgesia needed for 40% in

1998a. [55]	eous matched control group.	(90 in each group)	points	intervention.	continuous throughout labour.	acupuncture group vs 87% controls ( $p<0.0001$ )
Ternov et al. 1998b.  [56]	Retrospective comparison of 12 months records: before and after acupuncture introduced.	3317 (1708 no acup 1609 with acup)	Individualized and including tangential needling.	No intervention.	Variable but mostly continuous throughout labour.	After introduction of acupuncture, significant reduction in use of nitrous oxide, IM Meperidine, local Bupivacaine and sterile water ( $p<0.01$ )
Ramnero et al 2002 [49]	Randomised controlled	90	Individualised acupuncture to various points.	No intervention	Needles left in situ for one to three hours	Acupuncture group: significantly fewer epidurals & more relaxed. No difference in pain or labour outcomes.
Skilnand et al 2002 [51]	Controlled, single-blind, randomised study	210	Individualised acupuncture to various points	Minimal sham acupuncture	Variable but mostly continuous with needles taped down	True acupuncture reduced labour pain scores by c.20% more than sham and decreased time to delivery by over an hour.
Nesheim et al. 2003  [44]	Controlled: part randomised, part matched group. Non-blinded.	290 (106 acup 184 controls)	Individualised choice of acupuncture points with deqi .	No intervention (92 randomised 92 matched from register)	Most needles in situ 10 to 20 mins, some less, and some retained	Meperidine needed by 11% acupuncture group, 37% control group 1 ( $p=0.0001$ ) and 29% control group 2
Ziaei and Hajipour 2006  (69)	Randomised, controlled	90 30 acup 30 = control 1 30 = control 2	Points: GV20, Yintang, St 36, Sp6, LI4, LI3, CV2,3.	Control 1: Needled 6 points normally used for vaccination . Control 2: No	De Qi obtained. Needles taped and left in situ until delivery.	No significant differences in pain intensity or degree of relaxation but reduced need for augmentation (using intravenous oxytocin to stimulate contractions) in acupuncture group ( $p= 0.03$ for this)

				intervention		
Fan Qu et al 2006  (21)	Randomised, controlled	36	Electro-acupuncture to LI4 and Sp6 bilat. 2-100 Hz dense-disperse. Strength increased gradually.	No intervention or pain relief!	20 mins then repeated when 7-8 cms of cervical dilatation reached.	Mann-Whitney Test used to assess pain scores. Beta-endorphins and 5HT levels measured by blood analysis. Lower pain intensity in acupuncture group and better relaxation (p=0.018 & 0.013) Significant difference in concentration of endorphin and 5HT (p=0.037 & 0.030)
Hantoush-zadeh 2007  (27)	Randomised, controlled	144 70 real acup 74 minimal acup	Manual acu to individualised points inc LI4, BI32, UB60, Sp6, St36, Liv3, GB34, Ht 7. De Qi obtained	Non-acupuncture points. Needles manually stimulated for 20 mins but patients not asked about De Qi!	From active phase of labour until delivery or when patient requested removal or effect terminated or no effect.	VAS scale used for pain assessment. 1 <sup>y</sup> outcome=pain, duration and acceptability; 2 <sup>y</sup> =oxytocin use. Acup group better for pain score after 2 hours (p= <0.001), duration of labour (p<0.001) and oxytocin use (p=0.001 ). Willingness to have acup again 95% vs 74% controls
Martensson et al 2008  (39)	Prospective, randomised, controlled	128 62 acup 66 sterile water inj.	Manual to GV20, LI4, Sp6 plus individualised local points from BI23, 24, 54, Ex19, GB25-29 and Kid 11. De Qi obtained.	5-8 subcutaneous injections of 0.5 ml sterile water in area of pain.	Needles in situ 40 mins with manual stimulation every 10 mins.	Sterile water injections provided greater pain relief than acupuncture

Borup et al. 2009 (6)	Prospective, randomised, controlled	607 (314 acup 144 TENS 149 traditional analgesia)	Individualised manual acupuncture chosen from 34 specified points according to woman's mobility and pain locality.	TENS to lower back or traditional analgesia	Variable from 30 minutes to 2 hours and could be repeated.	Use of pharmacological and invasive methods significantly lower in acupuncture group (vs traditional $p<0.001$ ; vs TENS $p=0.031$ ) Pain scores comparable. Mean Apgar score at 5 mins and cord pH significantly higher (i.e. better) in acupuncture group. No difference in duration of labour or use of Oxytocin
Citkovitz C, et al. 2009 (13)	Case- controlled pilot study	45 acup, 127 historical controls	Electro-acupuncture to individualised points chosen from study protocol, with all patients having ear Shenmen, Uterus, Endocrine points plus LI4 and Sp6.	Matching with 1-3 patients drawn in reverse chronological order on basis of matching parameters.	Electro-stimulation at continuous frequency of 10Hz, amplitude set to patient's comfort level between 3-6 mA. Duration not mentioned.	Acupuncture group had significantly fewer Cesarean sections (7% vs 20%, $p= 0.004$ ). No significant differences noted in other clinical endpoints but 87% of patients commented how acupuncture had helped them. On multiple occasions, increase in strength and/or regularity of contractions noted after needle stimulation esp to BL67
Tempfer et al, 1998 – see section 5 – no significant difference in use of analgesics [54]						
Zeisler et al, 1998 – see section 5 – no significant difference in use of analgesics [68]						

#### 4. INDUCTION / DURATION OF LABOUR

STUDY	CONDITION	TRIAL DESIGN	NO.	ACUPUNCTURE TREATMENT	CONTROL	TREATMENT AMOUNT	RESULTS
Tsuei et al 1974 [59]	Induction of labour	Observational study	12 (4 still-births, 1 missed abortion, 7 post-dates)	Acupuncture to LI 4 and Sp 6 bilaterally with electro-stimulation for 10 participants	None	Continuous throughout labour	Uterine contractions initiated in 10 out of 12 cases (83% success rate). Average induction to delivery time was 13.1 hours.
Ledergerber 1976 [34]	Induction of labour	Case series	17 (12 at term, 5 pre-term)	Electro-stimulation and electro-acupuncture to Ren3 and Sp15.	None	Induction: stimulation every 3 mins for 15 secs, followed by needling if unsuccessful.	100% success in 12 patients at term; of 5 pre-term patients, 3 were successful.
Yip et al 1976 [67]	Induction of labour	Case series	31	Electro-Stimulation to Sp6 and LI4 at 5 cycles per second.	None	Continuously throughout first stage of labour	21/31 were successful; majority needed less analgesia than is usual.
Tsuei et al 1977 [60]	Induction and inhibition of labour	Observational study	60 (41 induction at term, 7 mid-term abortion, 12 inhibition of premature labour)	For inhibition of labour: electro-acupuncture to Sp 4. Induction: electro-acupuncture to LI4 & Sp 6. For mid-term as above plus GB34 & Ren1 on 2nd day.	None	For induction, max 8 hours, repeated next day if no response. If response, treat until delivery. For inhibition: twice daily for 1st 3 days then twice weekly up to 20 times.	For induction 78% success at term. 0% for mid-term abortion. For inhibition, success rate 92% .



Lin 1998  (36)	To accelerate labours with abnormal progress.	Case series	62	LI4(reinforced) and Sp 6(reduced)	None	For 30 minutes	Average speed of cervical dilation increased after acupuncture ( $P=<0.001$ ). Intensity and frequency of contractions also improved ( $P=<0.05$ )
Perera, 1979 – see section 3 – induction to delivery interval shortened [46]							
Kubista & Kucera 1974  [32]	Preparation for labour from 37 weeks gestation in primiparae.	Contemporaneous matched control group	120 (60 acup, 60 control)	St 36, Kid 8, GB34 and Bl62 . No manual manipulation or electric stimulation; even technique; deqi.	No intervention	At weekly intervals before due date, 3 to 4 times, for 20-25 minutes.	Subjective length of labour shorter in acup group ( $P<0.02$ ) and active phase of labour shorter in acup group ( $P<0.1$ )
Kubista et al. 1975  [33]	Induction of labour with intact membranes	Contemporaneous matched control group	70 (35 acup, 35 control)	Electro-acupuncture to Kid 8, St36, Ren 6, "Bachmann 25" point.	No intervention	For an average of 2 hours	All in treatment group experienced contractions within 25 minutes. 31 had statistically significant increase in contraction frequency and intensity ( $P<0.01$ ). No significant change in controls.
Lyrenas et al. 1987  [37]	Length of pregnancy and duration of labour	Controlled, not randomised-acupuncture group self-selected.	204 (56 acup, 112 control plus 36 in two reference groups)	St36, Sp6, GB34 and Bl62. Manual needling; even technique; deqi.	Control group: no intervention Ref grp 1: lumbar puncture and interview Ref grp 2: no intervention.	Once weekly from week 36 until delivery.	Acupuncture group appeared to have longer gestations and duration of labour was not shortened (second stage was longer). More use of oxytocin in acupuncture group.

Tempfer et al. 1998  [54]	Duration of labour; levels of maternal serum factors involved in cervical maturation	Matched pairs – women giving birth in same time period, matched for age and parity	80 (40 acup, 40 control)	Du20, He7, P6 : bilateral, manual needling with deqi	No acupuncture	Once weekly for 4 weeks, starting week 35	Total labour: 136 mins less in acup group ( $p<.001$ ). First stage (3cm up to full dilation ): 139 mins less ( $p<.001$ ). Second stage: 2 mins longer No signif diffs in interleukin-8, prostaglandin F2 $\alpha$ , $\beta$ -endorphin. No differences in analgesic use or maternal birth injuries
Zeisler et al 1998  [68]	Duration of labour. First parity only.	Contemporaneous matched control group	57 acup 63 control	Du20, He 7, P6: bilateral, manual needling with deqi	No acupuncture	Once weekly for 4 weeks, starting week 36	Median duration of first stage of labour was 196 mins in acup group v 321 in control. No difference in second stage.
Rabl et al. 2001  [38]	Cervical ripening and induction of labour at term	Randomised controlled	45 (25 acup, 20 control)	LI4 and Sp6, "neutral" needle technique, deqi obtained.	No intervention	For 20 minutes	Acupuncture helped cervical ripening ( $P=0.04$ ) and shortened time interval between due date and actual time of delivery (5.0 vs 7.9 days) ( $P=0.03$ )
Gaudernack et al. 2006  (23)	Augmentation in labour after spontaneous rupture of membranes at term.	Randomised controlled	91 43 acup 48 control	All had St36, Liv 3, and CV4. Individualised points acc to TCM, from GB41, K6, K3, Sp6, LI4, San6, Lu7, Ht7	No acupuncture	For 20 minutes	Duration of labour significantly reduced in acup group ( $p=0.03$ ) and significant reduction in need for oxytocin ( $p=0.018$ ). Acup group who needed induction had significantly shorter active phase ( $p=0.002$ )
Harper et al. 2006  (28)	Induction of labour in nulliparous women	Randomised controlled. Usual medical care vs usual care plus acupuncture	56 30 acup 26 control	LI4, Sp6 Electro to Bl 31 and 32 All points bilateral	Routine medical care	30 mins for 3 out of 4 consecutive days	Mean time to delivery 21 hours sooner in acup group ( $p=0.36$ ); spontaneous labour 70% vs 50% favouring acup group ( $p=0.12$ ); Caesarean Section less likely

							(p=0.07)
Pei and Huang, 1985 – see section 3 - shorter course of labour in acupuncture group [45]							
Skelton & Flowerdew 1988 – see section 3 – significantly shorter first stage for primigravids in acupuncture group [50]							
Skilnand, 2002 – see section 3– time to delivery reduced by more than 1 hour in acupuncture group (51]							
Ziaei (69) 2006 – see section 3 – no effect on duration of labour							
Hantoushzadeh 2007 (27) – see section 3 - shorted duration of labour and less oxytocin							

## 5. MISCELLANEOUS CONDITIONS

STUDY	CONDITION	TRIAL DESIGN	NO.	ACUPUNCTURE TREATMENT	CONTROL	TREATMENT AMOUNT	RESULTS
Wang & Jin 1989  [64]	Caesarian section - acupuncture anaesthesia	Retrospective case series	a) 24271 (1975-80)  b) 16649 (1981-87)	Refer to paper for details	None	Refer to paper for details	a) 92% success (i.e. sufficient analgesia achieved) b) 99% success  Refer to paper for further details
Chauhan 1998  [11]	Placental Retention	Retrospective comparison over 2 years	75 (30 - acup 45 – control)	Acupuncture bilaterally to Bl67 and/or Ren3	Manual removal of placenta	Acupuncture until delivery of placenta, up to 20 minutes, then considered non response.	83% in acupuncture group delivered placenta in 20 minutes. Complication rate 20% in acupuncture group and 58% in manual removal group.
Guerreiro da Silva 2007  (25)	Emotional complaints in pregnancy	Prospective, quasi-randomised, controlled	51 (28 acup, 23 control)	Standardised points including Ht7, PC6, Lu9, St36, Liv3, <i>Yintang</i> , GV20, CV17, plus up to 4 additional points to individualise treatment.	Counselling and/or phytotherapeutic agents ( <i>Passiflora edulis</i> or <i>Hypericum perforatum</i> )	Weekly, occasionally twice over 8 weeks = minimum 8 trs, maximum 12 trs	Numerical Rating Scale scores of intensity of emotional distress decreased by at least half in 60% of the study group and 26% of control group, ( $p=0.013$ )

