



## Research Article

# Acupuncture in Postdate Pregnancy Management



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### KEYWORDS

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### Abstract

**Objectives:** Pharmacological labor induction is obtained through prostaglandins application and/or oxytocin infusion; however, the use seems to be related to fetal and maternal side effects. Traditional Chinese Medicine advocates the use of acupuncture to soften the cervix and induce uterine contractions. at which presented for The primary outcome was the rate of women admitted for labour induction in case of prolonged pregnancy at 41 + 5 weeks, and the secondary outcome was the rate of induction planning for other indications.

**Methods:** After obtaining informed consent, 375 undelivered women after 40 + 2 gestational age were enrolled for the study: 112 women received acupuncture and 263, routine care. Acupuncture was applied every odd day starting from 40 + 2 weeks up to 41 + 4 weeks. Women allocated to the control group received standard care. At 41 + 5 weeks, a pharmacological induction was planned.

**Results:** The rate of labor induction significantly differed between acupuncture and observation groups (19.6% vs. 38%;  $p < 0.01$ ); in particular, women receiving acupuncture showed a lower rate of induction, indicating prolonged pregnancy (5.3% vs. 10.1%;  $p < 0.01$ ).

As far as the pharmacological device is concerned, no differences were observed with regard to the prostaglandins use, whereas oxytocin infusion rate was lower in the acupuncture group than in the observation group.

**Conclusions:** The present study suggested that acupuncture applied at term of pregnancy seems to be effective in reducing the rate of labor induction which is performed for prolonged pregnancy at 41 + 5 weeks. Moreover, acupuncture also seems to be able to reduce oxytocin use; such a “saving” effect could play a role in childhood, considering that a recent study underlined the adverse effect of oxytocin on birth outcomes.

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## 1. Introduction

There is worldwide concern with increasing rates of pharmacologically induced labor and consequent operative delivery [1–3]. One of the most common indications for labor induction is postdate pregnancy; even if there is no consensus about the exact definition of “postdate,” the induction is generally performed between 41 and 42 weeks. Guidelines recommend considering labor induction between 41 and 42 weeks [4,5]; several data demonstrate that elective labor induction decreases the rate of stillbirth without increasing the caesarean section rate [3,6].

A recent Cochrane review suggests that induction after 41 weeks compared with awaiting spontaneous labor was associated with a lower rate of perinatal mortality and morbidity and caesarean sections [7].

Pharmacological labor induction is obtained through intracervical/vaginal prostaglandins and/or oxytocin infusion, both related to fetal and maternal side effects [8]. In particular, oxytocin infusion increases the rate of caesarean section and operative delivery [9], whereas vaginal prostaglandin administration increases the risk of an excessive uterine activity associated with fetal distress without affecting caesarean section and operative delivery rate [10].

In the last 10 years, nonpharmacological methods of labor induction, including acupuncture, have received attention, also considering that women would like to avoid medical or surgical interventions in childbirth. This attitude may certainly contribute toward the popularity and diffusion of complementary and alternative medicine/therapies [11].

Traditional Chinese Medicine advocates the use of acupuncture/acupressure to soften the cervix and induce uterine contractions [12]. The more recently updated Cochrane review concluded that few studies assessed the role of acupuncture in labor induction without reaching conclusions on this topic. The review included 14 trials (2,220 women) reporting the mode of delivery and maternal and neonatal morbidity, whereas no data were collected regarding the rate of failed induction (vaginal delivery not achieved within 24 hours) and the rate of the onset of uterine excessive activity associated with fetal distress [13].

Previous reports showed a weak effect of acupuncture on labor onset. The gestational age, the mode of stimuli application, and the duration of treatment widely differed between the studies making the comparison difficult [14–18].

Similarly, a recent study performed by us also showed that acupuncture applied starting at 40 + 4 weeks every odd day for 1 week seems to be ineffective to reduce the rate of labor induction performed for prolonged pregnancy at 41 + 5 [19].

The present study represents a further attempt to investigate this issue considering a larger sample of women. The primary outcome was the rate at which women presented for labor induction in case of postdate pregnancy at 41 + 5 weeks and the secondary outcome was the rate of induction planning for other indications.

## 2. Materials and methods

Pregnant women at term who referred to the Obstetrics Department of the University Hospital of Modena and Reggio Emilia were enrolled for the study. In our department, women with a single, uneventful pregnancy being classified as low risk according to National Institute for Health and Care Excellence CE guidelines on intrapartum care [20] chose at 36 weeks to deliver at the traditional doctor-led unit or at the Birth Centre, a midwife-led unit opened in 2006 with the mission of encouraging natural birth, avoiding interventions.

In both the cases, an antepartum visit at 36 weeks was planned for the file compilation and vaginal swab examination, and enrollment for the study was proposed on such an occasion. The nonstress test was planned at 40, 41, and 41 + 3 weeks and amniotic fluid index evaluation at 41 and 41 + 3 weeks. According to local guidelines, labor induction for prolonged pregnancy was offered at 41 + 5 weeks.

Inclusion criteria considered were as follows: low-risk singleton pregnancy, intact membranes, cephalic fetal presentation, and gestational age >40 + 2 weeks, as estimated by ultrasound before the 12<sup>th</sup> week. Exclusion criteria considered were as follows: maternal or fetal disorders, previous uterine surgery, contraindications to vaginal delivery, and Bishop score >4 at inclusion.

After oral consent to participate in the study was obtained, women were allocated to receive acupuncture and acupressure or the standard care on the basis of their preference. This choice is made because of the difficulty in preparing a randomization list considering that in our past experience, the women often refused the possibility of being allocated to the observation arm. Such a method of randomization certainly represents a bias for the study but avoids drop out because of refused allocation.

In the acupuncture group, women had acupuncture session every odd day starting from 40 + 2 weeks up to 41 + 4 weeks, and controls received standard care.

Other labor induction indications considered were prelabor rupture of membranes lasting 24 hours or 12 hours (without or with Streptococcus B Group vaginal swab colonization), amniotic fluid index lower than 4 cm or not reassuring nonstress test.

The acupuncture session (performed by a licensed acupuncturist, I.N., and F.F.) consisted of the insertion of sterile, disposable 0.30- to 4-mm acupuncture needles (Huanqiu; Qiu Tian, San Marino); after reaching the De Qi sensation, needles were left *in situ* for 40–45 minutes. During the session, women were positioned in a comfortable, quiet room.

Following Traditional Chinese Medicine indications, we stimulated acupoints indicated to enhance uterine activity, ripe the cervix, or relax the muscles and reduce anxiety [3]. *Hegu Large Intestine 4* is located in the middle of the first interosseous muscle of the hand, and the needle is inserted to a depth of 1–2 *cun*. It is claimed to improve uterine contractions. *Sanyinjiao Spleen 6* is located 3 *cun* above the medial malleoli, and the needle is inserted to a depth of 1.5–2.5 *cun*. It is claimed to promote the ripening of the cervix and to promote uterine contractions. *Zhusanli*

*Stomach 36* is located 3 *cun* above the tip of the medial malleoli on the medial border of the tibia, and the needle is inserted to a depth of 1–2 *cun*. It is able to improve circulation in the pelvic organs and is employed in several acupuncture formula. *Thaichong Liver 3* is located in the foot, in the interosseous muscle between the first and second toe, and the needle is inserted to a depth of 0.2–0.5 *cun*. It is used in particular to resolve the liver Qi stagnation. *Zhiyin Bladder 67* is located on the dorsal (upper) surface of the small toe (the fifth toe, digitus minimus) lateral and proximal to the nail. *Jian Jing Gallbladder 21* is located on the shoulder, directly above the nipple, at the midpoint of the line connecting DU 14 and the acromion. *Feng Shi Gallbladder 31* is on the midline of the lateral aspect of the thigh, 7 *cun* above the transverse popliteal crease. When the patient is standing erect with the hands hanging down close to the sides, the point is where the tip of the middle finger touches.

The *t* test was used to compare continuous variables, and  $\chi^2$  was used to compare relative frequencies. Data are reported as mean  $\pm$  standard deviation. A *p* value less than 0.05 was considered as statistically significant.

### 3. Results

The final analysis was based on 375 cases because, of the 402 women reaching the inclusion criteria, eight in the acupuncture group and 19 in the observation group delivered before term of pregnancy. One-hundred twelve women received acupuncture (group ACU) and 263, routine care (group CONTROL). No differences were observed between ACU and CONTROL group for maternal age ( $32.5 \pm 4.7$  vs.  $31.6 \pm 5.5$  years), rate of high school degree (53.6% vs. 38.8%), rate of nulliparous women (66.1% vs. 55.9%), gestational age to hospitalization ( $287.7 \pm 3.1$  vs.  $287.1 \pm 2.9$  days), and prelabor rupture of membranes (32.1% vs. 31.2%).

The gestational age at delivery differed between the groups, being lower in the acupuncture group than in controls ( $289 \pm 2.7$  vs.  $291 \pm 2.1$ ;  $p < 0.05$ ). Hence, the women subjected to acupuncture experienced a higher rate of spontaneous onset of delivery than those receiving observation (75% vs. 52.8%;  $p < 0.01$ ). As a consequence, the rate of labor induction differed significantly between groups, being lower in the ACU than in the CONTROL group, 19.6% (22/112) versus 38% (100/263) ( $p < 0.01$ ). In particular, we

found that the induction indicated for prolonged pregnancy was lower in women receiving acupuncture 5.3% (6/112) than controls 10.1% (24/263) ( $p < 0.01$ ) (see Table 1).

As far as the drugs used is concerned, no differences were observed with regard to the use of prostaglandins, whereas oxytocin infusion rate was lower in the ACU than in the CONTROL group (Fig. 1).

Moreover, the ACU and CONTROL groups do not differ in caesarean section rate (12.5% vs. 14.8%), birth weight ( $3532.7 \pm 375.8$  vs.  $3537.1 \pm 399.1$  g), and postpartum blood loss ( $470.9 \pm 331.6$  vs.  $400.9 \pm 321.5$  mL), whereas the rate of operative delivery is lower in women treated with acupuncture than the controls (6.3% vs. 11.4%;  $p < 0.05$ ).

### 4. Discussion

This study investigates the effects of acupuncture applied before planned induction in postdate pregnancy. Women submitted to acupuncture experienced a higher rate of spontaneous delivery and delivered earlier than controls. They also showed a lower rate of labor induction indicated for prolonged pregnancy at 41 + 5 weeks.

Moreover, we found that women receiving acupuncture needed a lower rate of oxytocin infusion either alone or associated with prostaglandins. It could be hypothesized that acupuncture stimulation is able to activate a biochemical process optimizing uterine contractility.

Biochemical studies suggest that acupuncture stimulates central oxytocin release and parasympathetic uterine activity, increasing contractility [16,21,22], but until now, clinical observations do not seem to confirm such an effect. In fact, acupuncture seems to be ineffective to induce labor onset when applied near term [14,15,18,19], whereas a slight effect was observed when starting in the last month of pregnancy [16,17]. Such data could be interpreted considering that the acupuncture is probably more effective in increasing uterine activity than to ripe the cervix.

The heterogeneity of the acupoints choice and the gestational week at entry in the study make the comparison between the studies very complex. The application of shared guidelines for the acupuncture treatment according to Standards for Reporting Interventions in Clinical trials of Acupuncture (STRICTA) guidelines is also advocated and should be considered in further studies [23].

A recent review including seven trials (748 cases) about the acupressure application for labor onset and duration reached similar conclusions; acupressure seems to be able to shorten the first stage of labor but not affect the labor onset in postdate pregnancy [24].

Among the previous studies applying acupuncture, a study performed by us in a selected population referred to the Birth Centre, a midwives-led delivery unit, confirmed that acupuncture applied near term was ineffective in reducing the rate of labor induction planned for postdate pregnancy, although a survival analysis performed excluding women requiring labor induction demonstrated that women receiving acupuncture showed a trend to deliver earlier than women in the observation group [19]. The positive result obtained in the present study could be related to both the enlarged sample and to the inclusion of women referred to the Clinic of term pregnancy; in fact,

**Table 1** The table shows the drugs used to perform labor induction.

Methods of induction	ACU group (22 cases)	C group (100 cases)	<i>p</i>
Prostaglandins	8.9% (10)	8.7% (23)	not significant
Oxytocin	8.9% (10)	16.7% (44)	<0.05
Prostaglandins plus oxytocin	1.8% (2)	12.5% (33)	<0.05

ACU = acupuncture group; C = control group.

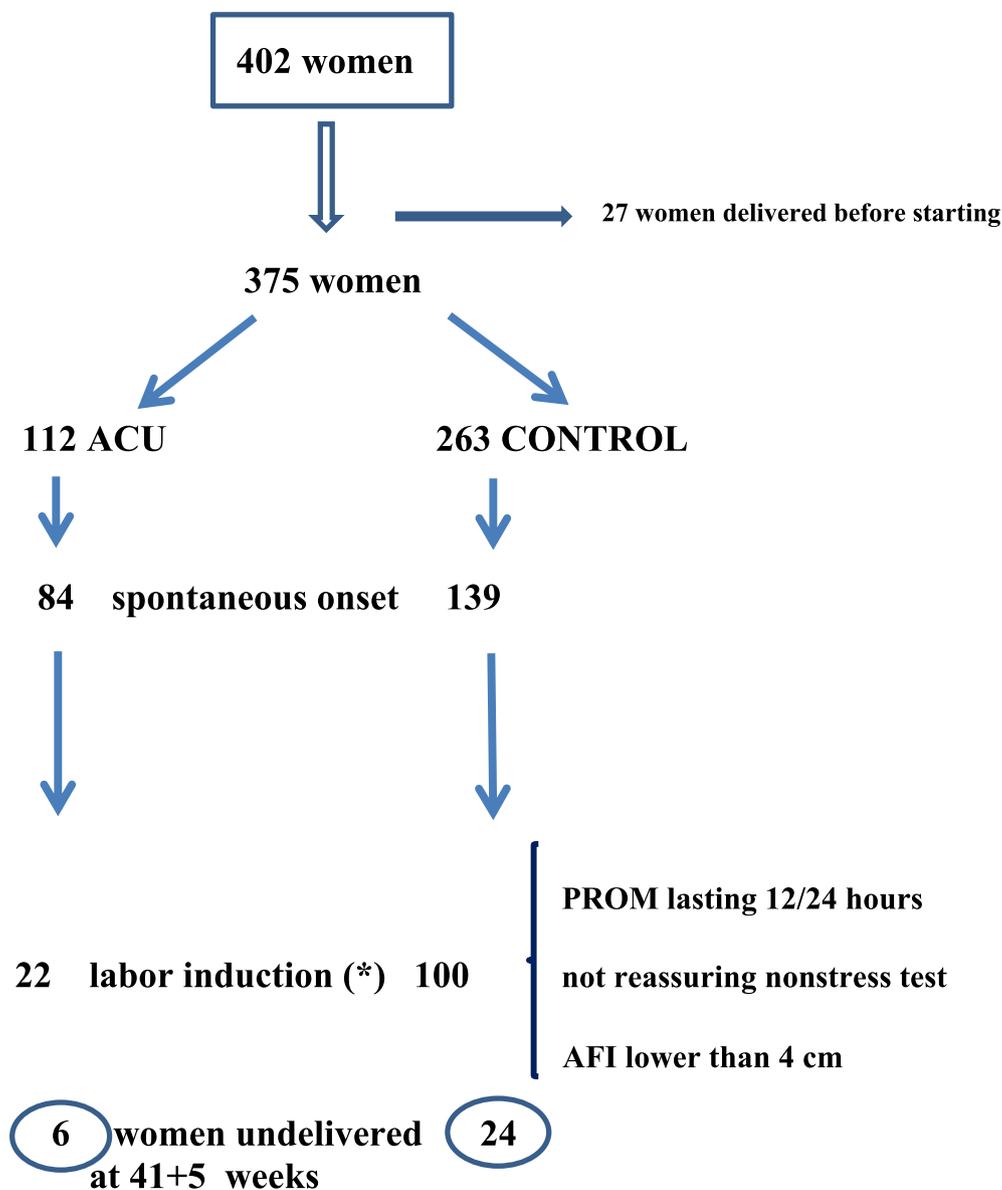


Figure 1 The figure shows the flow chart of the study.

the Birth Centre collected a selected population showing a lower rate of labor induction. From this point of view, the effect of acupuncture could be more evident in a sample of general population.

Moreover, the treatment assignment played a role in favor of the positive effect of acupuncture; in fact, women choosing acupuncture are probably more predisposed to this method. This certainly represents a bias of the study but also a starting point for further consideration about the possible interactions between attitude toward acupuncture and its effects. In any case, further studies should consider a randomization list to obtain more accurate data.

The side effects of pharmacological labor induction and augmentation are well known; oxytocin infusion increases the rate of caesarean section and operative delivery [9], whereas vaginal prostaglandin administration increases the risk of an excessive uterine activity associated to fetal distress without affecting caesarean section and operative delivery rate [10]. The effect of “drug saving” showed by

acupuncture treatment could play a strong role in childhood, considering that recent studies underlined the adverse effect of oxytocin on birth outcomes, in particular, increased risk of instrumental vaginal birth and episiotomy [25].

The results obtained in the present study stimulate a more extensive application of acupuncture in postdate pregnancy to obtain strong scientific evidence.

### Disclosure statement

None declared.

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