

**Acupuncture as a Means to Promote Full Term Vaginal Delivery**

By

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**Approvals Signatures Page**

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2/18/15

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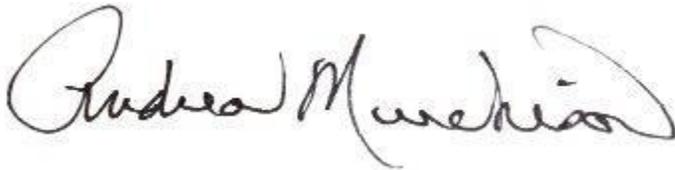


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### **Abstract**

With labor induction and cesarean surgery rates at a record high, a method to decrease the incidence of labor induction, decrease the rate of cesarean surgery and increase the success of labor induction when it does occur should be examined. The objective of this study is to explore the evidence through qualitative research analysis, the effects of acupuncture on labor, specifically the effect of acupuncture on shortening labor duration and how acupuncture may soften the cervix and reduce the need for medical intervention and associated risks. This review of the literature will define the obstacles of labor and shed light on the benefits of using acupuncture for this purpose making pre-birth acupuncture an accepted tool for preparing a woman for labor. This study can be of value to the acupuncture community, the Western medicine community, and their pregnant patients.

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## **Chapter One: Introduction**

For many women, the modern process of labor and delivery is vastly different than the process of natural labor experienced by their forbearers. Today, the cesarean delivery rate for all births in the United States is at a record high of 32%, a 60% increase from 1996 (Osterman & Martin, 2013). Further, some method of labor induction is utilized in 20%-25% of all pregnancies, with up to half of these failing (Marroquin, Tudorica, Salafia, Hecht, & Mikhail, 2013). This unprecedented iatrogenic influence on labor is due to a combination of factors including: patient preference (elective cesarean section surgery and induction), maternal obesity, poor prenatal care, and lack of public education (Osterman & Martin, 2013). Moreover, failed labor induction and cesarean section surgery (CS) are associated with a host of complications both for the current pregnancy and for a woman's future reproductive lifetime (Spong, Berghella, Wenstrom, Mercer, & Saade, 2012). For these reasons, a method to decrease the incidence of labor induction, decrease the rate of CS and increase the success of labor induction when it does occur would be welcome. Studies show that pre-birth acupuncture may accomplish these goals.

### **Research Objective & Overview**

Examining the effects of acupuncture on labor, specifically the effect of acupuncture on shortening the duration of labor is the focus of this study. The biochemical effects of acupuncture on labor will be explained and how pre-birth acupuncture may reduce the rate of CS and failed inductions in uncomplicated full term pregnancies. This review of the literature will also define the obstacles of labor and shed light on the benefits of using acupuncture for this purpose making pre-birth acupuncture an accepted tool for preparing a woman for labor. This research synthesis can be of value to pregnant women, as an alternative to current labor inducing medications that have associated risks. This study can also be of value to the acupuncture community to prepare

pregnant patients for labor, and to the Western medicine community to work in conjunction with acupuncturists to prepare pregnant patients for labor, therefore lowering labor induction rates and the associated risks.

My personal goal for examining the research further is to encourage full term vaginal childbirth in order to reduce birth complications, reduce the rate of labor inductions and CS, and lower healthcare costs. As a Chinese medicine health care practitioner working at a birthing center, I am passionate about offering pregnant women the safe and effective option of acupuncture for labor preparation in hopes of improving labor outcomes. The need to share the valuable evidence found in the studies with my pregnant patients and other health care professionals has become essential as my practice grows. With further inspection of the research, I recognize a gap in the integration of Eastern and Western medicine when preparing women for labor. The evolution of integrated medicine will render patients exceptional care benefiting the mother, the baby, and their family.

### **Statement of Research Questions**

- 1. Does acupuncture shorten the duration of labor?*
- 2. Does acupuncture shorten the duration of labor in patients with PROM?*
- 3. Does acupuncture soften the cervix?*
- 4. Does acupuncture reduce the need for medical labor induction?*
- 5. Does acupuncture reduce the number of cesarean section surgeries?*

### **Acupuncture**

#### **History**

Acupuncture, a key component of Traditional Chinese medicine (TCM), involves the insertion of thin needles at specific points on the body. Originally derived from Latin, the term

acupuncture is a combination of *acus*, a needle, and *punctura*, a puncture. Acupuncture points correspond to neurological pathways connected to internal organs, called meridians. The balanced flow of Qi or energy through the meridians is the primary focus of TCM. Other modalities included in TCM are herbal prescriptions, moxibustion, cupping, gua sha, tui na, lifestyle and nutritional guidelines, and qi gong.

*The Yellow Emperors Classic of Internal Medicine* was the first text to illustrate the use of Chinese medicine. Dating between 100-300 BC, the ancient Chinese text unveiled the basic principles that constitute Chinese medicine; Taoist philosophy, Yin and Yang theory, the Four Seasons, and the Five Elements.

In 1237 A.D, *The Complete Book of Effective Prescriptions for Diseases of Women* was the first book published to examine the effects of Chinese medicine on gynecological disorders. The book included diagnosis and treatment for premenstrual syndrome, dysmenorrhea, abnormal uterine bleeding, uterine fibroids, chronic pelvic inflammation, endometriosis, and infertility. Image 1 is an example of a Chinese medicine obstetrics illustration found in ancient text.

**Image 1: Ancient Illustration**  
Retrieved from [www.happygoatproductions.com](http://www.happygoatproductions.com)



Popularity of Traditional Chinese Medicine grew in the United States after relations with China improved in 1971. This political progression along with the New York Times article about acupuncture for post appendectomy pain management increased TCM awareness around the world.

### **Use in Western Medicine**

Acceptance of TCM in Western medicine is growing as new studies offer evidence of its effectiveness. Hundreds of medical journals provide detailed up to date research on the many uses of acupuncture in Western medicine. Research shows that acupuncture treatments induce changes to human physiology by instigating the release of endorphins and improving blood flow (Hsieh et al., 2001). Today, some Western physicians are using acupuncture to treat patients experiencing pain, while the United States military offers auricular acupuncture to treat soldiers with Post Traumatic Stress Disorder. Hospitals and medical offices now have the opportunity to offer both Eastern medicine and Western medicine creating an integrated system of health care for all patients.

The World Health Organization (WHO) lists diseases, symptoms, and conditions proven through clinical trials to be treated effectively by TCM and acupuncture. Some of these diseases include allergic rhinitis, arthritis, back pain, chemotherapy adverse reactions, depression, dysmenorrhea, headache, hypertension, induction of labor, malposition of fetus (breech presentation), morning sickness, neck pain, postoperative pain, sciatica, and stroke (World Health Organization [WHO], 1996).

### **Use in Women's Health**

Acupuncture benefits have been evaluated in multiple studies in treating gynecological issues, such as dysmenorrhea, menstrual irregularities, and ovulatory dysfunction. Iorno et al. (2008) found that dysmenorrhea, or pain during menstruation, was greatly reduced with acupuncture treatments while also reducing the need for NSAIDS and their associated side effects. Johansson and Stener-Victorian (2013) found that acupuncture showed benefits in regulating the menstrual cycle and inducing ovulation in women with Polycystic Ovarian

Syndrome. According to WHO guidelines, acupuncture is safe, drug free option for pregnant women. Pre-birth acupuncture can prevent unnecessary interventions in normal pregnancy and labor and support the natural birthing process (WHO, 1996).

Today, pre-birth acupuncture is gaining validation as a form of labor preparation by various medical professionals. Debra Betts (2006), midwife, acupuncturist, and author of *Essential Guide to Acupuncture in Pregnancy and Childbirth*, encourages midwives and other labor support professionals to recommend acupuncture as a safe and effective treatment to promote natural labor. Recent interests in further utility of acupuncture in pregnancy have prompted investigation of acupuncture in preparing the uterus for labor. Along with Debra Betts, researchers are studying the various effects of acupuncture on labor in order to provide evaluated benefit to the medical world.

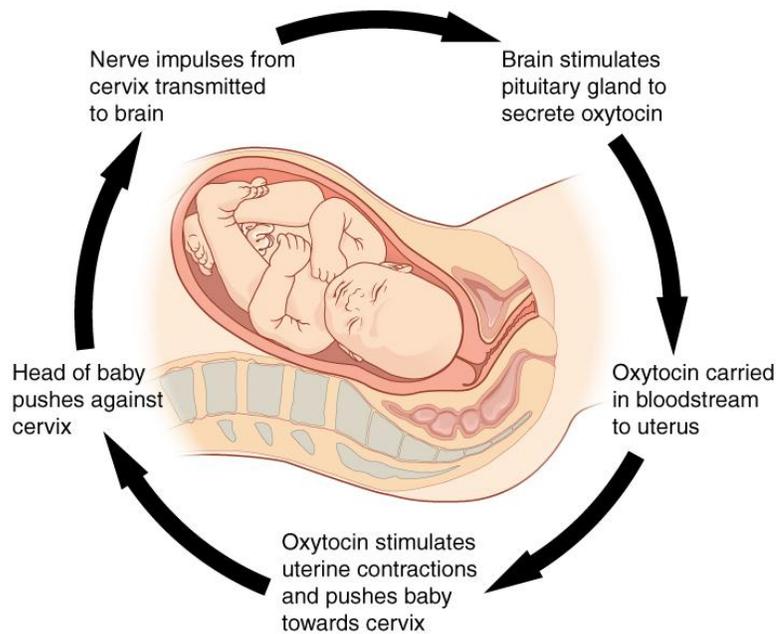
## **Labor**

### **Definition**

Labor is defined as regular rhythmic involuntary contractions of the uterus resulting in the softening and dilation of the cervix. In order for the natural mechanism of labor to begin, biochemical factors in the mother and baby must be congruent. This connection leads to a specific sequence of events allowing the baby to make its way through the birth canal to being born, also known as the pregnancy positive feedback loop. Image 2 illustrates the sequence of events that occur allowing the baby and mother to prepare for delivery.

### Image 2: Pregnancy Positive Feedback Loop

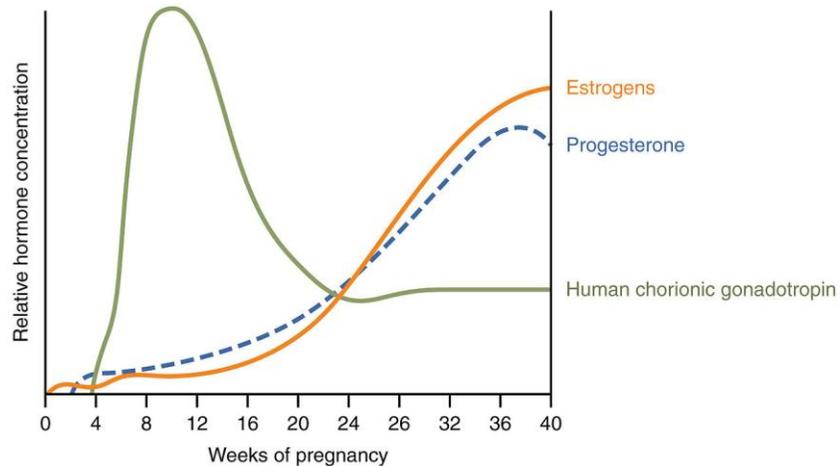
Retrieved from [http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@6.27/Anatomy\\_&\\_Physiology](http://cnx.org/contents/14fb4ad7-39a1-4eee-ab6e-3ef2482e3e22@6.27/Anatomy_&_Physiology)



Although the exact cause of the onset of labor is still unknown, many potential factors have been studied. One of these factors is the decline in human chorionic gonadotropin (hCG), a hormone produced by the placenta as illustrated in Image 3 below.

### Image 3: Pregnancy Hormone Changes

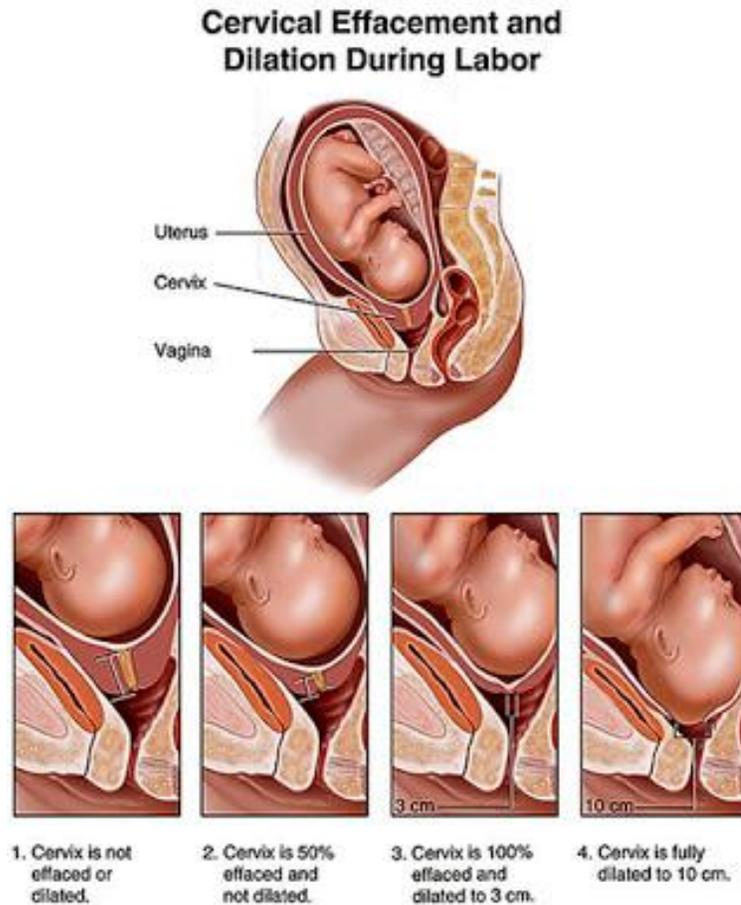
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Another factor that is required for the labor process to begin is the softening, effacement, and dilation of the cervix prompted by pro-inflammatory biochemical events (Stjernholm-Vladic et al., 2004). Image 4 provides a visual explanation of the softening of the cervix progression.

**Image 4: Cervical Effacement and Dilation Process**

Retrieved from <http://www.med.umich.edu>



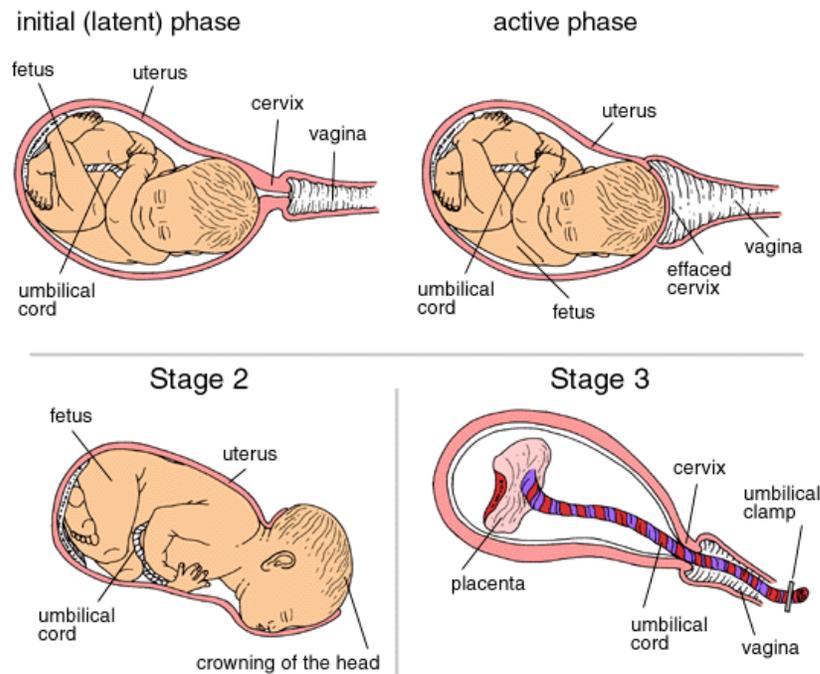
The American College of Obstetrician and Gynecologists (ACOG) reports that a full term pregnancy with a single fetus lasts 40 weeks (280 days) from the first day of the last menstrual period. Labor beginning before week 37 is considered preterm labor. Labor beginning weeks 37-41 is considered term labor. Any date past 41 weeks is considered post term labor (The American College of Obstetrician and Gynecologists [ACOG], 2004).

Labor and childbirth consists of three stages as illustrated below in Image 5. The first stage includes latent and active labor. Latent labor begins with the effacement or softening of the cervix, leading to the dilation of the cervix. Contractions during this stage vary with intensity and pain. As the cervix begins to dilate more rapidly, active labor begins, contractions increase in regularity and intensity with the cervix dilating to 10 cm, allowing the descent of the baby into the birth canal. The second stage of labor begins with complete dilatation of the cervix and includes active pushing by the mother. This stage ends with the delivery of the baby. The third and final stage of labor consists of the detachment and delivery of the placenta. Both the mother and baby's physiology are responsible for promoting and maintaining efficient labor in all stages. Any disturbance in the stages of labor may lead to clinical problems requiring additional medical intervention.

### Image 5: Stages of Labor

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#### Stage 1

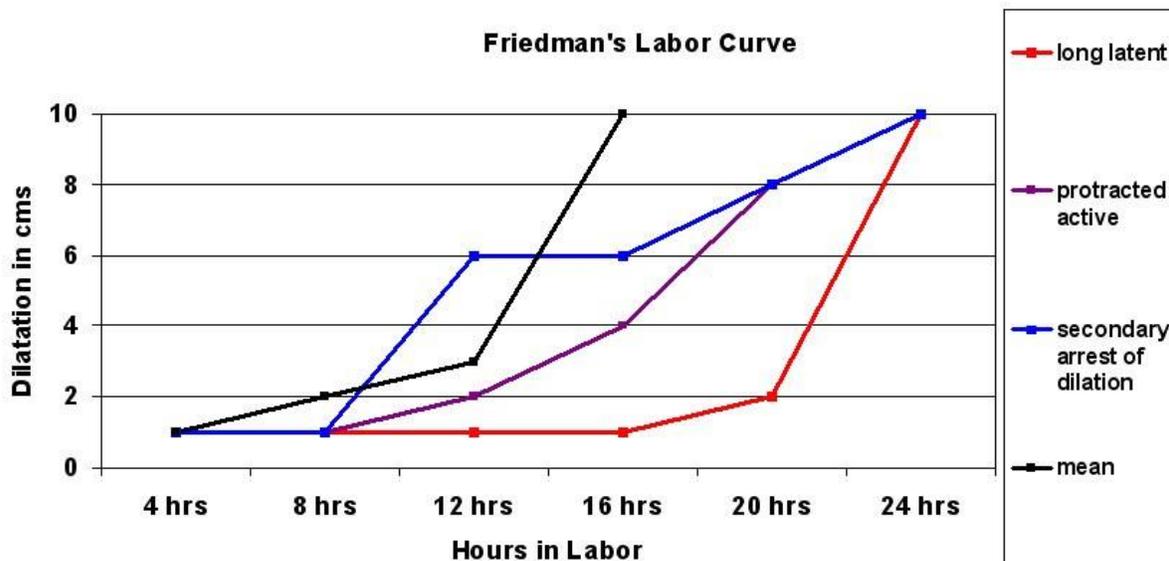


### Labor Progression Disorders

Historically, the standard for the assessment of normal labor progression was the ‘Friedman curve’. Established by Emanuel Friedman in the 1950’s, the Friedman curve was developed after evaluating the course of labor of 500 pregnant women at a New York hospital. Based on his data, the transition from the latent phase to active phase of labor occurred at 3 to 4 cm cervical dilation, and the minimal rate of normal cervical dilation during the active phase was 1.2 cm/hr for nulliparous women and 1.5 cm/hr for multiparous women (Friedman, 1954), which can be seen in Image 6 below.

**Image 6: Friedman’s Labor Curve Chart**

Retrieved from <http://www.birthsource.com/scripts/article.asp?articleid=120>



Recent studies have established new, longer thresholds due to changes in medical practices and patient characteristics. Zhang et al. (2010) now defines protraction disorder during the first stage of labor as labor with slower than normal progress, taking more than six hours to progress from 4 to 5 cm, and more than three hours to progress from 5 to 6 cm. Arrest disorder

during the first stage is defined as the complete cessation of labor progress, diagnosed at cervical dilation more than or equal to 6 cm dilation in a patient with ruptured membranes and no cervical change for more than or equal to 4 hours with regular contractions or no cervical change for more than or equal to 6 cm with irregular contractions. Poor labor progression is diagnosed after 6 cm dilation with monitoring another four hours if uterine contractions are adequate. Oxytocin, the only medication approved by the US Food and Drug Administration for labor stimulation in the active phase, is recommended for women with poor labor progression. If contractions are not adequate after six hours, operative delivery is indicated (Zhang et al., 2010).

During the second stage of labor, Zhang et al. (2010) found the median duration of labor in nulliparous women without anesthesia was 0.6 hours and 0.2 hours for multiparous women. Arrest disorder during the second stage of labor is defined as no progress of fetal station and descent or rotation more than or equal to three hours in nulliparous women and more than or equal to two hours in multiparous women. As long as there is progress and fetal heart rate is normal, no intervention is indicated.

Premature rupture of membranes (PROM) is the rupture of membranes prior to the spontaneous onset of labor at term. Ninety percent of women with PROM go into labor naturally within 48 hours, however, there is a risk of ascending intrauterine infection, requiring further medical intervention if labor does not occur (Gaudernack, Forbord, & Hole, 2006).

Post-term pregnancies, pregnancies beyond 41 weeks gestation, carry associated risks including increased infant mortality, perineal injury, obstructed labor, and an increase in the rate of medical inductions and cesarean deliveries (ACOG, 2004). Recent research shows that babies born at full term, between 39 weeks 0 days and 40 weeks 6 days gestation, have better health outcomes compared to babies born before or after this period (ACOG, 2004). Caughey and

Musci (2004) evaluated complications beyond 37 weeks and found that the rates of meconium and macrosomia increased beyond 38 weeks gestation, the rates of operative vaginal delivery, chorioamnionitis, and endomyometritis all increased beyond 40 weeks gestation, and rates of intrauterine fetal death and cesarean delivery increased beyond 41 weeks gestation.

### **Common Western Treatments and Statistics**

One of the most commonly performed obstetrical interventions in the United States is the induction of labor (IOL). In 2012, the Centers for Disease Control (CDC) reported 23% of all live births in the U.S. were the result of labor induction, a twofold increase from 1990 (Martin et al., 2013). Labor induction is any technique used for stimulating uterine contractions prior to the onset of spontaneous labor. Intravaginal prostaglandins, intravenous oxytocin, artificial rupture of membranes (AROM), and mechanical dilation of the cervix with cervical balloon are all induction treatments used in various combinations and in compliance with ACOG guidelines. Of these, oxytocin infusion or vaginal prostaglandins are the most conventional treatments (Gaudernack et al., 2006). Successful IOL's are often linked to tall stature (over 5 ft 5 in), increasing gestational age, non-obese maternal weight, infant birth weight less than 8lbs, white race, higher education, early initiation of prenatal care, and a favorable cervix (Martin et al., 2009).

The method of labor induction is most frequently determined by the Bishop score, a system commonly used to evaluate the cervix on a scale from 0 to 10 points (Gaudernack et al., 2006). This system is based on four characteristics of the cervix: dilation, effacement, consistency, and position (Crane, 2006) as seen in Image 7 below. A high Bishop score (equal to six or more) is predictive that the cervix will respond to induction methods and result in vaginal delivery. Laughon et al. (2012) found that vaginal delivery rates were higher for women who had

a favorable cervix compared to women who had an unfavorable cervix for all methods of induction. If a Bishop score is low (equal to or less than five), inductions are more likely to fail and result in cesarean delivery (Spong et al., 2013).

**Image 7: Bishop Score Scale**

Retrieved from <http://www.community.babycenter.com>

Cervix	Score			
	0	1	2	3
Position	Posterior	Mid-position	Anterior	---
Consistency	Firm	Medium	Soft	---
Effacement	0-30%	40-50%	60-70%	>80%
Dilation	Closed	1-2cm	3-4cm	>5cm
Baby's Station	-3	-2	-1	+1, +2

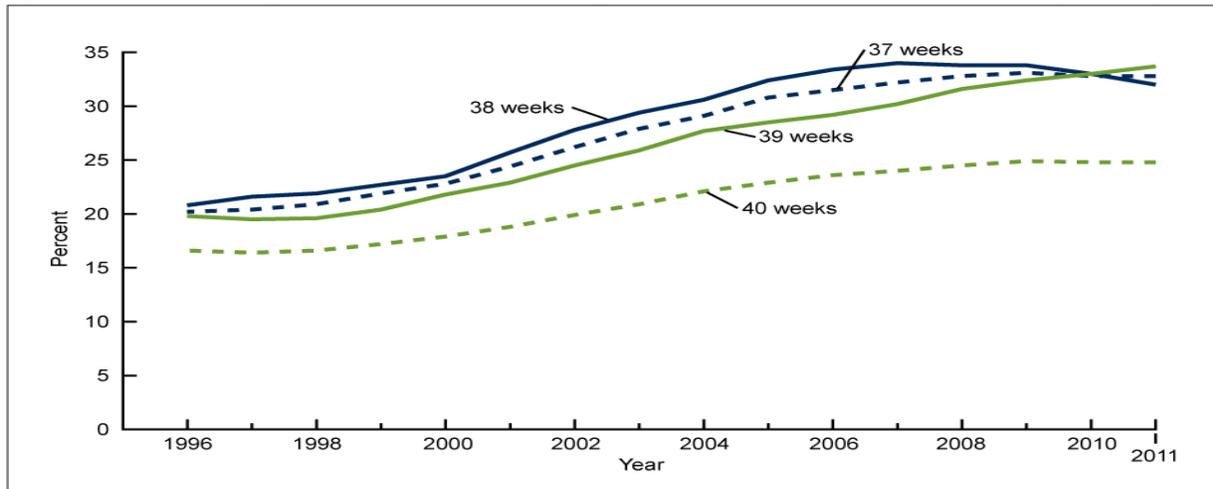
Cesarean section surgeries (CS) have been part of human culture since ancient times. Greek mythology, European folklore, and Chinese etchings first introduced the procedure. Julius Caesar later decreed under Roman law that all pregnant women ready for childbirth must be cut open. Over time, CS use in clinical practice became a life saving procedure for both the mother and baby. Indications and global trends for CS have varied over the years (Sewell, 1993). According to the World Health Report, CS recent patterns show underuse in low-income settings and adequate or even unnecessary use in middle and high-income settings (Gibbons et al., 2010). Today, one in three pregnancies are delivered by cesarean section in the United States. This high rate makes CS the single most commonly performed surgery in the US with over one million

procedures performed each year (Spong et al., 2013). Image 8 provides CS delivery rates in the United States recorded by the CDC from 1996-2011.

### Image 8: Cesarean Delivery Rates in the United States 1996-2011

Retrieved from <http://www.cdc.gov/nchs/data/databriefs/db124.htm>

Figure 2. Cesarean delivery at 37, 38, 39, and 40 weeks of gestation: United States, final 1996–2010 and preliminary 2011



NOTES: Singletons only. Thirty-seven and 38 weeks are considered early term; 39 and 40 weeks are considered full term. Access data table for Figure 2 at: [http://www.cdc.gov/nchs/data/databriefs/db124\\_tables.pdf#1](http://www.cdc.gov/nchs/data/databriefs/db124_tables.pdf#1).

SOURCE: CDC/NCHS, National Vital Statistics System.

In post term pregnancies, an elective IOL is commonly offered to pregnant women at week 41 to avoid undesirable outcomes affiliated with prolonged pregnancy. Marroquin et al. (2013) performed a study to determine the rate and factors associated with successful IOL in nulliparous patients with a low Bishop score undergoing scheduled IOL at 41 weeks gestational age. Patients with younger age, lower BMI, and lower maternal weight had better outcomes. Researchers also found the use of cervical balloon and oxytocin were more often associated with failed IOL leading to further complications (Marroquin et al., 2013).

### Biochemical Factors of Labor

Although the exact mechanism of parturition remains elusive, the onset of labor has been found to be the result of coordinated endocrine changes in both the mother and the fetus. The pain and stress of labor causes an endocrine response by the pituitary gland, placenta and various

other organs with the secretion of B-endorphins (Bacigalupo, Riese, Rosendahl, & Saling, 1990). Bassett and Thorburn (1969) found labor activation to be driven by fetal pituitary adrenal axis, increased fetal cortisol secretion, and the induction of placental enzymes that instigate steroid conversion. These fetal changes cause the maternal progesterone levels to fall and estradiol levels to rise prompting an increase in intrauterine production of prostaglandins, cervical softening, and the onset of myometrial contractions in the uterus (Bassett & Thorburn, 1969). Dong, Gangula, Fang, and Yallampalli (1996) found that the expression of cyclooxygenase-2 (COX-2), the isoform responsible for the synthesis of prostaglandins, increased during pregnancy but decreased immediately after labor in rats. According to Sennstrom et al. (2000), cervical ripening is similar to an inflammatory process brought about by cytokines such as interleukin (IL)-8, IL-6, and granulocyte colony-stimulating factor (G-CSF) while, Bernal (2003) states that uterine contractibility is prompted by the interaction between actin and myosin in myometrial smooth muscle cells.

### **Biochemical Factors of Acupuncture**

The biochemical influence of acupuncture has been evaluated in multiple studies throughout a variety of organ systems. In the hypothalamus and limbic system, Liao et al. (1979), found that the stimulation of acupuncture points increased the unloading of thalamic nuclei in the hypothalamic anterior pituitary system. Sato, A., Sato, Y., and Suzuki (1994) found that acupuncture stimulation produced reflex responses in visceral functions, such as gastric motility and bladder contraction in anesthetized animals. Pomeranz (1995) proposed that acupuncture stimulation activates the release of neurotransmitters, serotonin, dopamine, and norepinephrine into the spinal cord leading to the inhibition and suppression of pain, acupuncture-induced analgesia. Hsieh et al. (2001) confirmed Pomeranz's theory by establishing

that acupuncture performed at the classical point LI 4 increased cerebral blood flow and brain activity in the hypothalamus releasing endorphins that cause an analgesic effect throughout the body. Kim et al. (2003) found that the expression of COX-2 was significantly reduced with acupuncture at point SP 6 in pregnant rats showing a link between the acupuncture point and uterine motility while also suggesting the possible benefit of controlling preterm labor. Uchida and Hotta (2007) reviewed several studies and found that uterine blood flow was increased after cutaneous stimulation of the hind paw and perineal area in anesthetized animals.

### **Biochemical Effects of Acupuncture on Labor**

Zeisler, Rabl, Joura, and Husslein (2000) compared 40 pregnant women who received prenatal acupuncture to 40 pregnant women who received usual care to evaluate the effect of prenatal acupuncture on serum levels of prostaglandin E2 during labor. The women in the prenatal acupuncture treatment group received one treatment a week beginning in the 36<sup>th</sup> week of gestation with a minimum of four sessions. Blood samples were obtained from the women in both groups at the end of the first stage of labor. Researchers measured the serum levels of prostaglandin E2 with an enzyme immunoassay. Results showed a statistically significant increase in serum levels of prostaglandin E2 in the women who received prenatal acupuncture compared to the non-acupuncture group ( $p=0.04$ ) (Zeisler, Rabl, Joura, & Husslein, 2000).

Tempfer et al. (1998) performed a matched pair study dividing 80 pregnant women into a pre-natal acupuncture group and a non-acupuncture group to measure the serum levels of substances active in cervical ripening and dilation. The acupuncture group received acupuncture treatment once a week for four consecutive weeks starting from the 35<sup>th</sup> week of gestation. Maternal blood was collected from both groups within five minutes after the end of the third stage of labor, the placental delivery. Serum levels of IL-8, PGF, and B-endorphin were

measured by use of enzyme-linked immunosorbent assay, enzyme immunoassay, and immunoradiometric assay. Results showed no statistically significant differences between the two groups however, it is unclear whether or not the timing of the blood collection may have affected the results (Tempfer et al., 1998).

## Chapter Two: Literature Review

### Does Acupuncture Shorten the Duration of Labor?

Hantoushadeh, Alhusseini, and Lebaschi (2007) examined the effects of acupuncture on nulliparous women during labor with respect to pain, labor duration, and maternal acceptability. Researchers randomly assigned 144 participants in spontaneous active phase of labor to an acupuncture group or a sham acupuncture group. Point selection varied in the acupuncture group depending on the patient's symptoms and TCM diagnosis. Needles were retained until delivery or patient's request. Results showed statistically significant differences in the acupuncture group compared to the sham acupuncture group. The acupuncture group had less pain, shorter duration of active phase ( $p=0.001$ ), less oxytocin units administered ( $p=0.001$ ), and a greater willingness to receive acupuncture again ( $p=0.001$ ). Researchers found no adverse effects of the acupuncture treatment on the mother or baby (Hantoushadeh, Alhusseini, & Lebaschi, 2007).

Jaiying et al. (2008) evaluated the benefits of electro-stimulation acupuncture at point LI 4 in addition to oxytocin for hastening uterine contraction. The researchers randomly divided 276 participants into a acupuncture plus oxytocin group (A+M) and a oxytocin group (M). Jaiying et al. found that acupuncture in addition to oxytocin had a 97% effective rate with 79% showing statistically significant effect in the A+M group compared to the M group ( $p<0.01$ ). Lee, Chang, and Kang (2004) found similar results when observing the effects of SP6 acupressure group compared to SP 6 touch control group. The acupressure group delivered 2.86 hours sooner than the control group ( $p=0.006$ ).

While measuring the serum levels of IL-8, PGF, and B-endorphin in pregnant women as previously mentioned, Tempfer et al. (1998) also examined the effect of acupuncture on labor duration. Participants in the acupuncture group received treatment one time a week for four

weeks starting at 35 weeks gestation. Acupuncture points (DU 20, HT 7, PC6) were inserted bilaterally and retained for 20 minutes during each session. Researchers found the acupuncture group had a significant reduction in labor duration compared to the non-acupuncture group ( $p=0.001$ ). Mean difference of total duration of labor between matched pairs with and without acupuncture was -136.5 minutes (Tempfer et al., 1998).

In addition to evaluating the effects of acupuncture on serum prostaglandin E2 levels as previously mentioned, Zeisler et al. (2000) also examined the effects prenatal acupuncture on labor duration. The 40 women in the acupuncture group received the same acupuncture treatment, which included bilateral acupuncture points (DU 20, HT 7, PC 6), one time a week, for four consecutive weeks, with treatment lasting 20 minutes. Researchers found that the pregnant women who received prenatal acupuncture in their study showed a significantly shorter duration of labor, specifically during the first stage ( $p < 0.01$ ) (Zeisler et al., 2000). These findings were in agreement with an earlier study performed by Zeisler, Tempfer, Mayerhofer, Barrada, and Husslein (1998) that examined the effects of acupuncture beginning at 36 weeks gestation.

Ajori, Nazeri, and Eliaspour (2013) conducted a double-blind randomized controlled trial of 80 pregnant women, 38-42 weeks gestation, to evaluate whether the use of acupuncture could initiate labor at term and reduce post-term induction. Participants were randomly allocated to an acupuncture group or a sham acupuncture group. Acupuncture points (SP 6, LI 4, BL 67) were inserted bilaterally and maintained for 30 minutes in the acupuncture group. The sham acupuncture group received shallow needling at the designated sham points for the same duration. Needling was administered in both groups up to two times over a one-week period. Although the results showed no significant difference, time to delivery from enrollment was

shorter for the acupuncture group compared to the sham acupuncture group ( $p= 0.06$ ) (Ajori, Nazeri, & Eliaspour, 2013). Similarly, a study by Gaudet, Dyzak, Aung, and Smith (2008) showed a trend towards shorter duration of labor with the acupuncture group delivering 94 hours sooner than the sham acupuncture group.

Smith, Crowther, Collins, and Coyle (2008) randomly assigned 364 women at 41 weeks gestation into two groups to estimate the clinical effectiveness of acupuncture to induce labor. Healthy participants who were scheduled for a post term induction were included in the study. Two days before scheduled induction, one group received two acupuncture sessions while the other group received two sham acupuncture sessions. Various acupuncture points were selected and retained for 30-40 minute duration in both groups. Smith et al. (2008) did not find a significant difference in the duration of labor or need for induction in the two groups, however, the sham acupuncture point locations reported in the study were near the same location as the acupuncture group points which raises the question of reliability of sham acupuncture use in this study (Smith, Crowther, Collins, & Coyle, 2008).

Ramnero, Hanson, and Kihlgren (2002) investigated the effects of acupuncture treatment during labor with respects to pain intensity, degree of relaxation and outcome of delivery. The researchers randomly selected forty-six parturients in spontaneous labor to receive acupuncture treatment as a compliment, or alternative to conventional analgesia. Each acupuncture treatment was specialized for each patient. Needles were left in place and then removed one to three hours later. A protocol to assess pain intensity and degree of relaxation throughout labor was created and used during the study. Ramnero et al. concluded that acupuncture during labor significantly reduced the need for epidural analgesia (12% versus 22%) and patients in the acupuncture group had a significantly better degree of relaxation compared to the non-acupuncture group (mean

difference -0.93). Labor duration results were similar in both groups, AG 5.3 h compared to the CG 5.6 h, however no negative effects were found in delivery outcomes (Ramnero, Hanson, & Kihlgren, 2002).

### **Does Acupuncture Shorten the Duration of Labor In Patients with PROM?**

Gaudernack et al. (2006) performed a randomized controlled trial on 100 healthy parturients to investigate whether acupuncture would shorten the duration of labor after PROM at term. Nulli- and multiparas subjects were divided into an acupuncture group and a non-acupuncture group. The acupuncture group received one treatment, which included various points according to the patient's TCM diagnosis. If labor did not occur within 24 hours, medical induction occurred. Results showed a significant reduction in both the duration of labor (mean difference of 1.7h,  $p=0.03$ ) and the need for oxytocin infusion to induce labor ( $p=0.018$ ) in the acupuncture group compared to the non-acupuncture group. Findings also showed that although some of the patients in the acupuncture group needed the oxytocin infusion for induction, they still showed a significantly shorter duration of active phase of labor than the ones in the non-acupuncture group (mean difference 3.6h,  $p=0.002$ ) (Gaudernack et al., 2006).

Selmer-Olsen, Lydersen, and Morkved (2007) conducted a randomized controlled trial to assess if acupuncture influences the onset of labor and the need for induction after PROM in 106 nulliparous women and to investigate the effect on the mother's wellbeing. Inclusion criteria included women with a healthy pregnancy between 37-42 weeks gestation and confirmed rupture of membranes without contractions of the uterus. Various acupuncture points were used in the acupuncture group according to the patient's diagnosis. Needles were retained for 30 minutes and a second treatment was given the following day to participants not in labor. Although the researchers found no statistically significant difference between the acupuncture and non-

acupuncture groups regarding time from PROM to active phase of labor, the median time showed a shorter duration in the acupuncture group compared to the non-acupuncture group (15 hours versus 20.5 hours,  $p=0.34$ ). Researchers also found that women receiving acupuncture considered their treatment to be more positive than the non-acupuncture group ( $p=0.003$ ) (Selmer-Olsen, Lydersen, & Morkved, 2007).

### **Does Acupuncture Soften the Cervix?**

In addition to the Zeisler and Tempfer studies, Rabl, Ahner, Bitschnau, Zeisler, and Husslein (2001) and Gaudet et al. (2008) also looked at the effects of acupuncture on the cervix. Rabl et al. (2001) evaluated whether acupuncture at term can influence cervical ripening, induce labor, and reduce the need for postdates induction. The single-blind randomized controlled trial included 45 primiparous women divided into an acupuncture group and a non-acupuncture group. In the acupuncture group, acupuncture points (LI 4, SP 6) were needled every second day beginning at the woman's estimated date of conception (EDC). Cervical length measurements in the acupuncture group showed a significant shortening compared to the control group on day 6 and 8 after EDC ( $p=0.04$  for both). The acupuncture group also showed a significant reduction in the time period from EDC to delivery of 5.0 days, compared to the control group of 7.9 days ( $p=0.03$ ). In conclusion, Rabl et al. found acupuncture effective in ripening the cervix and shortening the duration between EDC and delivery (Rabl, Ahner, Bitschnau, Zeisler, & Husslein, 2001).

Gaudet et al. (2008) randomly assigned 16 pregnant women to an acupuncture group or sham acupuncture group to assess the effectiveness of acupuncture for the initiation of labor in women at term. The primary outcome was time from first acupuncture treatment to delivery. Secondary outcomes included the need for standard induction methods, duration of active labor,

the need for standard pain relief, and the safety of the infant. The acupuncture group received electrical stimulation to the four assigned bilateral acupuncture points (SP 6, ST 43, BL 60, LI 4) for 30 to 45 minutes. Needles were inserted in the same order, with each group receiving one to two treatments within the week of the study. Participants in both groups were instructed to apply acupressure to the selected points between treatments. The women in the acupuncture group, who labored spontaneously, delivered 94 hours sooner than those who had sham acupuncture. The acupuncture group also had a mean improvement in Bishop score of 6 points compared with no change in the sham acupuncture group. Researchers also noted acupuncture to be safe for the mothers and infants (Gaudet et al., 2008).

### **Does Acupuncture Reduce the Need for Medical Labor Induction?**

In addition to evaluating the influence of acupuncture on the duration of labor on 116 women, Zeisler et al. (1998) evaluated how acupuncture may reduce the need to medical labor induction. The acupuncture group received weekly treatments beginning in the 36<sup>th</sup> week of gestation. Twenty minute weekly sessions included points (DU 20, HT 7, PC 6) inserted bilaterally with a minimum of four treatments. Results showed a significant decrease in the first stage of labor in the acupuncture group compared to the non-acupuncture group (mean difference 2.1h,  $p=0.0001$ ). Zeisler et al (1998) also found that the non-acupuncture group received oxytocin significantly more often during the first stage of labor compared to the acupuncture group ( $p=0.01$ ). Higher oxytocin use in the non-acupuncture group persisted into the second stage of labor as well ( $p=0.03$ ). The study also showed a significant increase in PROM post acupuncture treatment showing a significance in pre-birth acupuncture treatment group 66.7% compared to the control group 33.3%, ( $p=0.02$ ) (Zeisler et al., 1998).

Zeisler's findings were supported by Gaudernack and Hantoushzadeh's studies previously mentioned, showing a significant reduction in oxytocin usage in the acupuncture groups compared to the control groups (Gaudernack et al., 2006, Hantoushzadeh et al., 2007), while Rabl and Selmer-Olsen studies showed a trend towards a reduction in medical inductions in acupuncture groups compared to control groups (Rabl et al., 2001, Selmer-Olsen et al., 2007).

### **Does Acupuncture Reduce the Number of Cesarean Section Surgeries?**

Harper et al. (2006) evaluated the utility of outpatient acupuncture for labor stimulation. Fifty-six primiparous women at 39.5 weeks gestation or greater were randomized into usual medical care versus usual care plus three outpatient acupuncture treatments. Acupuncture treatments (LI 4, SP 6, UB 31, UB 32) that included electrical stimulation were administered on three out of four consecutive days for 30 minute sessions. Subjects in the acupuncture group demonstrated mean time delivery 21 hours earlier than those without acupuncture. Women in the acupuncture group were more likely to enter labor spontaneously (70% vs. 50%) and less likely to deliver by cesarean section (39% vs. 17%) when compared to the non-acupuncture group. The study concluded that acupuncture is well tolerated among full-term primiparous women and holds promise in reducing interventions that occur in post-term pregnancies (Harper et al., 2006).

Citkovitz et al. (2009) compared a control group of 45 pregnant women receiving acupuncture to 127 historical controls matched for maternal age and gestational age to assess clinical effects and logistical feasibility of acupuncture during labor and delivery in a U.S. hospital setting. During the study, five licensed acupuncturists utilized a standard approach choosing some of the same points on each patient and adding additional points according to symptoms. The study showed that the acupuncture patients underwent fewer cesarean sections (7% vs. 20%) than the non-acupuncture group. Furthermore, 78% of the nurses reported an

improvement in patient's comfort with acupuncture, while 83% reported that the acupuncturist did not interfere with the hospital staff's work. In addition, 87% of the patients reported that acupuncture had increased their comfort level (Citkovitz et al., 2009).

Researchers Gribel, Coca-Velarde, and Moreira de Sa (2011) examined the effects of electro acupuncture compared to misoprostol use in inducing labor in patients with a Bishop score of  $< 7$  and observed labor outcomes in both methods. Sixty-seven patients with a Bishop score of  $< 7$  were divided into two groups, electro acupuncture group (AC) and misoprostol group (M). Patients in group AC were bilaterally electro-stimulated through needles at acupuncture points (LI 4, ST 36, LR 3, SP 6, BL 23, BL 32) for 30 minutes. Electro-acupuncture sessions were performed every seven hours up to three identical sessions within a 24-hour time period. Group M results showed significantly higher cesarean section rate ( $p=0.014$ ) and a higher frequency of obstetric complications than group AC. No obstetric complications were found in the acupuncture group ( $p=0.036$ ) and results showed a higher patient satisfaction in the AC patients than the M patients ( $p=0.046$ ). In contrast to Rabl, Gribel et al. observed longer labor duration and no change in cervical softening for patients in the AC group compared to the M group ( $p=0.0362$ ) however, the longer duration did not have clinical significance (Gribel, Coca-Velarde, & Moreira de Sa, 2011).

### **Chapter Three: Methodology**

The objective of this study is to explore the evidence through qualitative research analysis, the effects of acupuncture on labor, specifically the effect of acupuncture on shortening labor duration and how acupuncture may soften the cervix and reduce the need for medical intervention and associated risks. This chapter will include the research method and discuss the process used to gather information leading to this objective.

#### **Research Design**

The Research Synthesis data was compiled through the online search of 101 peer-reviewed articles in medical journals found on Pubmed and Google Scholar, and articles accessed through the Yo San University Library using the following key words: acupuncture and labor, labor preparation, pre-birth acupuncture, cervical ripening, labor induction, prenatal acupuncture, labor duration, delivery, prostaglandins, hCG, uterus, maternal serum, hypothalamus, pituitary, Spleen 6, Large Intestine 4, contraindicated points, cesarean section, rupture of membranes, biomechanics of labor, and softening cervix.

#### **Instruments and Procedures**

The research synthesis data was collected and analyzed using an article abstraction forms created by the researcher beginning on April 1<sup>st</sup>, 2014 and ended on April 1<sup>st</sup>, 2015. Data collected from each article was then organized and used to chart findings. A summary of findings was generated to show the effects of acupuncture on labor outcomes such as labor duration, softening of the cervix, cesarean section rate, western treatment intervention, and patient satisfaction. Point combinations, duration of treatment, number of treatments, electro-stimulation, and sham points were also categorized to give the researcher an overview of

methods used. The study was conducted on the researcher's personal computer and took place in the researcher's home and at the Yo San library.

### **Inclusions and Exclusions**

To be included, studies needed to be published in English, in peer reviewed journals before 1970 and include pregnant women between weeks 35-42 gestation receiving acupuncture for labor preparation. Studies were excluded if they used patients that were considered high-risk with conditions such as breech presentation, preeclampsia, or gestational diabetes. Additionally, studies which did not properly document methodology or which acupuncture points were used were excluded.

## **Chapter Four: Results**

### **Data Analysis and Overview**

101 peer-reviewed articles were identified for use in determining the effects of acupuncture on labor duration. Of these, 85 were rejected because they were unavailable for public use, not published in English, or did not properly document methodology or which acupuncture points were used. Of the remaining 16 studies, 14 were conducted in countries other than the United States. All 16 studies took place in a hospital or university setting. The oldest used study was published in 1998, the newest in 2013. Study size in articles reviewed ranged from 16-364 participants. All treatments began between 35 and 42 weeks gestation. Several different acupuncture point combinations were used in the studies with duration and number of treatments varying. The most common acupuncture points used were LI 4 and SP 6. The average treatment duration reported was 30 minutes and number of treatments varied between 1-5 treatments. Four of the studies utilized electro-stimulation acupuncture as the study group, four studies used sham acupuncture as the control group, two of the studies utilized acupressure techniques in addition to the acupuncture treatments provided by the practitioner, and one study only used acupressure as the study group. Two of the 16 studies included multiparous participants in addition to primiparous participants. There were no negative effects to the mother or baby's health found in the acupuncture study groups. Acupuncture was also well tolerated by patients and the hospital staff. The data is summarized in Table 1 below.

**Table 1: Overview of Research**

(EA=Electro-stimulation Acupuncture, UC=Usual Care, AP=Acupressure, DX=Diagnosis)

Study	Participants (N)	Gestational Age	Treatment Method	Number of Treatments	Points Used	Treatment Duration
Gaudet, 2008	16	39-40	Acu/Sham	2 x, 1 week	LI4, SP6, +AP	30-45 min
Ajori, 2013	80	38-42	Acu/Sham	2	LI4, SP6, UB67	30 min
Harper, 2006	56	39-41	Usual Care/ UC+EA	3	LI4, SP6, UB31, UB32	30 min
Gribel, 2010	67	39-41	EA/ Misoprostol	1-3 x, 24h	LI4, SP6, LV3, UB31, UB32	30 min
Gaudernack, 2006	100	39-40	Acu/NoAcu	1	ST36, LV3, CV4, +DX	20 min
Zeisler, 1998	116	36	Acu/NoAcu	1 x week, 4 weeks	DU20, PC6, HT7	20 min
Ramnero, 2002	90	>37	Acu/NoAcu	1	Varied	1-3 hours
Smith, 2008	364	41	Acu/Sham	2	Varied	30-40 min
Citkovitz, 2009	45	37-41	EA/ NoAcu	1	Varied	Varied
Selmer-Olsen, 2007	106	37-42	Acu/NoAcu	1-2	Varied	30 min
Hantoushzadeh, 2007	140	39-40	Acu/Sham	1	Varied	Varied
Tempfer, 1998	80	35	Acu/NoAcu	1 x week, 4 weeks	DU 20, HT7, PC6	20 min
Rabl, 2001	45	36	Acu/NoAcu	4	LI4, SP6	Not stated
Lee, 2004	75	>37	AP/ Touch	1	SP6	30 min
Zeisler, 2000	80	36	Acu/NoAcu	1 x week, 4 weeks	DU 20, HT7, PC6	20 min
Jaiyang, 2008	276	37-42	EA/EA+ Oxytocin	1	LI4	30 min

**Effects of Acupuncture on Labor Duration**

Fifteen of the 16 studies reviewed for this paper examined whether acupuncture shortens the duration of labor. Fourteen of these showed a shorter duration in the acupuncture group. Eight of these studies showed statistically significant shorter labor duration. Three of the eight studies showing significant shorter labor duration initiated weekly acupuncture treatments beginning 35-36 weeks gestation. One study showed the acupuncture group to have a longer duration of labor compared to the control group, however this did not negatively affect clinical outcomes in the acupuncture group. A summary of findings is listed below in Table 2.

**Table 2: Overview of Labor Duration Results**  
(AG=Acupuncture Group, CG=Control Group, h=Hours)

Study	Statistically Shorter Duration	Shorter Duration	Longer Duration	Pre-birth Acupuncture
Gaudet, 2008		AG 9.42 h, CG 11.78 h; (2 h 20 min)		
Ajori, 2013		AG 94.7%, CG 89.2%; (p=0.06)		
Harper, 2006		AG 124, CG 145; 21 h, (p=0.36)		
Gribel, 2010			(p=0.03)	
Gaudernack, 2006	AG 4 h 28 min, CG 6 h 5 min; (p=0.02)			
Zeisler, 1998	AG 196 min, CG 321 min; (p=0.0001)			X
Ramnero, 2002		AG 5.3 h, CG 5.6 h		
Smith, 2008		AG 5.9 h, CG 6.5 h; (p=0.5)		
Selmer-Olsen, 2007		AG 14 h, CG 20.5 h; (p=0.12)		
Hantoushzadeh, 2007	AG 3.41 h, CG 4.45 h; (p=0.001)			
Tempfer, 1998	-136.5 min, (p=0.001)			X
Rabl, 2001	AG 5 days, CG 7.9 days; (p=0.03)			
Lee, 2004	-2.864, (p=0.006)			
Zeisler, 2000	AG 226 min, CG 348 min; (p=0.01)			X
Jaiyang, 2008	AG 97%, CG 70%; (p=0.01)			

### Effects of Acupuncture on Labor Duration in Patients with PROM

In addition to labor duration, two of the studies specifically examined if acupuncture shortens the duration of labor in patients with premature rupture of membranes (PROM). One study showed statistical significance in shorter duration in women in the acupuncture group, a significant reduction in the need for medical induction of oxytocin infusion to augment labor, as well as a significantly shorter duration of labor in those who had an induction. This study also showed significantly shorter duration in acupuncture group participants with induction with active phase of birth recorded as half the time compared to those in the control group. The second study showed a trend towards shorter duration of labor in the acupuncture group compared to the non-acupuncture group in the active phase of labor with less need for medical induction, and those who had induction also had shorter labor duration. An overview of labor duration in patients with PROM results is shown below in Table 3.

**Table 3: Overview of Labor Duration in Patients with PROM Results**  
(AG=Acupuncture Group, CG= Control Group, h=Hours)

Study (PROM)	Shorter Duration w/o Induction	Shorter Duration w/Induction	Medical Induction
Gaudernack, 2006	AG 4 h 28 min, CG 6 h 5 min; (p=0.02)	AG 3.46 h, CG 7.06 h; (p=0.002)	Significant reduction in oxytocin in AG, (p=0.018)
Selmer-Olsen, 2007	AG 14 h, CG 20.5 h; (p=0.12)	AG 5.6 h, CG 7.1 h; (p=0.92)	AG 12.5%, CG 17%; (p=0.53)

### Effects of Acupuncture on Softening the Cervix

Five studies were reviewed that evaluated the effects of acupuncture on the cervix. One study showed significant softening of the cervix. One study showed significant increase in serum levels responsible for softening the cervix in the acupuncture group compared to the control group. Both of these studies included four acupuncture treatments during their evaluation. Another study that utilized four acupuncture treatments showed no significant change in serum levels in the acupuncture group compared to the control group however, the serum was collected after delivery in contrast to the study previously mentioned showing significant change. One study showed a 6 point improvement in Bishop score in the acupuncture group compared to no change in the control group. Results are detailed below in Table 4.

**Table 4: Overview of Softening Cervix Results**

(AG=Acupuncture Group, CG= Control Group, EA= Electro-stimulation Acupuncture)

Study	Bishop Score Improvement	Serum Levels	Treatment Method	Number of Treatments
Gaudet, 2008	AG 6 points, CG no change		Acu/Sham	2 x, 1 week
Gribel, 2010	No significant difference		EA/ Misoprostol	1-3, 24h
Tempfer, 1998		No significant difference	Acu/NoAcu	4
Rabl, 2001	Significant shorter cervical length in AG, (p=0.04)		Acu/NoAcu	4
Zeisler, 2000		AG 31.4 pg/ml, CG 6.3 pg/ml; (p=0.04)	Acu/NoAcu	4

### Effects of Acupuncture on Medical Labor Induction Rates

Seven of the 16 studies reviewed examined the effects of acupuncture on medical labor induction rates. Three of these studies showed a significant reduction in oxytocin administration in the acupuncture group compared to the non-acupuncture group with one also showing a higher rate of PROM in the acupuncture group post treatment. One showed a trend towards less oxytocin usage and a significant reduction in medical induction rates when comparing the acupuncture group to the control group. Two studies showed no significant difference between the groups however they did show a significant reduction in cesarean section surgery rates in the acupuncture group compared to the control group. Table 5 below provides a detailed summary of findings.

**Table 5: Overview of Medical Labor Induction Rate Results**  
(AG=Acupuncture Group, CG= Control Group)

Study	Oxytocin	Medical Induction	Frequency of Cesarean Section	PROM (post treatment)
Gribel, 2010		No significant difference	AG 11, CG 21; (p=0.014)	
Gaudernack, 2006	AG 9, CG 21; (p=0.018)			
Zeisler, 1998	AG 2, CG 11; (p=0.01)			AG 66.7%, CG 33.3%; (p=0.02)
Citkovitz, 2009		No significant difference	AG 7%, CG 20%; (p=0.004)	
Selmer-Olsen, 2007		AG 12.5%, CG 17%; (p=0.53)		
Hantoushzadeh, 2007	AG 5.63, CG 7.81; (p=0.001)			
Rabl, 2001	AG 56%, CG 65%; (p=0.54)	AG 20%, CG 35%; (p=0.3)		

### Effects of Acupuncture on Cesarean Section Surgery Rates

Five out of the 16 studies examined cesarean section surgery (CS) rates. Three of these studies demonstrated a lower CS rate, while the other 2 showed no difference between the groups. The 3 studies that showed lower CS rates in the acupuncture groups compared electro-stimulation acupuncture to non-acupuncture. Two studies showed no difference between the control and study groups. In these studies, sham acupuncture was used as the control. The lack of difference may reflect how sham acupuncture actually effect's study outcomes, rather than the lack of effectiveness of the acupuncture. An overview of findings is provided below in Table 6.

**Table 6: Overview of Cesarean Section Surgery Rate Results**  
(AG=Acupuncture Group, CG= Control Group)

Study	Cesarean Section Surgery Rate	Electro-stimulation Acupuncture	Sham Acupuncture
Gaudet, 2008	No Difference		X
Harper, 2006	AG 17%, CG 39%; (p=0.07)	X	
Gribel, 2010	AG 11, CG 21; (p=0.014)	X	
Citkovitz, 2009	AG 7%, CG 20%; (p=0.004)	X	
Hantoushzadeh, 2007	No Difference		X

## **Chapter Five: Discussion**

The evidence found through qualitative research analysis was evaluated to show the effects of acupuncture on labor, specifically the effect of acupuncture on shortening labor duration and how acupuncture may soften the cervix and reduce the need for medical intervention and associated risks. The contribution of this study is to support previous statements that acupuncture shortens the duration of labor and may reduce medical intervention rates. The present study findings show that shorter labor duration is achieved with acupuncture treatment. Pre-birth acupuncture specifically proved to be effective in shortening labor duration and should be examined further. This study also showed a reduction in medical induction rates and CS rates in acupuncture groups. Acupuncture shows a trend towards improving Bishop score and softening the cervix however, more studies should examine this further in order to confirm effectiveness.

### **Limitations of Study**

The current research analyzed showed several limitations. Sample size was one of those limitations. A larger sample size would have given this study more credibility. Groups within each study were also small. Many studies began with a larger number of participants but ended with a smaller number due to the following variables; misplacement of files, violation of protocols, randomization at wrong gestational age, sham tube difficult to adhere to skin, patient compliance, timing of treatment, use of acupuncture before study began, labor failure to progress, undiagnosed breech presentation, delivery before treatment began. Many of the studies found for this research synthesis did not utilize rigorous scientific methods and statistical analysis. A variety of acupuncture points were used and the studies did not follow a specific protocol. Each study utilized their own method of collecting participants, choosing points

selected, duration of treatment, timing of treatment related to gestation, and number of treatments which made it difficult to give a comparative view of the findings. Some studies utilized sham acupuncture groups compared to acupuncture groups, which may have affected the results and raise question of reliability. This study's findings may have changed had there been more studies to review with larger sample size that utilized rigorous scientific methods and specific protocols.

### **Future Directions of Study**

Future studies are encouraged to continue examining how acupuncture affects the physiology of labor. Larger study groups and standardized protocols will give TCM higher credibility in both the Eastern and Western medical world. Creating a specific protocol, points used, and treatment length when preparing women for labor will provide more detailed results. Researchers are encouraged to examine the effects of specific acupuncture points as well as compare different protocols and their influence on labor. Comparing acupuncture groups to usual western medical care groups will exclude any question about the reliability of sham acupuncture in future studies.

It is important for more studies to evaluate pre-birth acupuncture beginning at week 35 of gestation in hopes of providing stronger evidence of acupuncture benefits for the health of the mother and baby. The costs of pre-birth acupuncture treatments are considerably lower than the cost of medical inductions and the associated interventions that may occur as a result. A more integrated system will improve the lives of our patients and reduce medical costs overall.

Due to lack of medical malpractice insurance coverage for treating pregnant or laboring patients, many acupuncturists may choose to avoid treating pregnant patients. With studies showing no negative side effects of acupuncture on the mother or baby, more medical malpractice insurance companies should cover acupuncture treatment during pregnancy and

labor. This would allow more acupuncturists to offer pre-birth and labor treatments without risking their practice.

### **Conclusion**

In conclusion, the research shows acupuncture to be a safe, effective, and well-tolerated option for pregnant mothers as a means to promote full term vaginal delivery. As more studies show acupuncture benefits in shortening labor duration, decreasing the need for medical induction, and reducing cesarean section surgeries, mothers seeking a complimentary safe option for labor preparation now have a choice. Acupuncture has shown no negative side effects in the studies and is a very affordable option to both the medical and public population in preparing women for labor. Acupuncture shortens labor duration and medical intervention rates, allowing a healthy laboring mother to efficiently deliver a healthy baby. Public awareness about the effects of labor induction and the associated risks help women stay informed. Cesarean section surgeries not only affect mothers in the current delivery, they also affect future deliveries and the medical system. Lowering the CS rate in the United States and globally where overuse has been seen will create a better healthcare system worldwide. It is our responsibility as medical professionals to provide safe and effective treatment options to our patients and it is my hope that acupuncture awareness will continue to grow and research will continue to provide the proof of its effectiveness.

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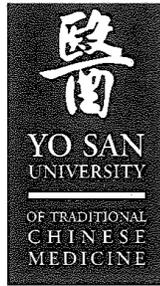
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**Appendix A: IRB Approval Letter**

March 28<sup>th</sup>, 2014

Mechelle Greenspan, L.Ac.  
2362 Scott Ave.  
Los Angeles, CA 90026

Dear Mechelle,

Your revised research proposal has been approved, with no additional recommendations effective through March 31, 2015.

Should there be any significant changes that need to be made which would alter the research procedures that you have explained in your proposal, please consult with the IRB coordinator prior to making those changes.

Sincerely,

*Penny Weinraub, L.Ac.*

Penny Weinraub, L.Ac.  
IRB Coordinator

**Appendix B: Data Collection Instrument**

**Article Abstraction Form For Acupuncture and Labor Studies**

Reviewer: Mechelle Greenspan

Date of Review:

**Title:**

**Authors:**

Date Published:

Research Setting & Location:

**Participants:**

Number of Subjects:

Gestational Age:

Primiparous/Multiparous:

PROM:

**Treatment Protocol:**

Treatments beginning at gestational week:

Acupuncture points used:

Electro-stimulation:

Acupressure:

Sham:

Length of Treatment:

Number of Treatments:

Cervical Ripening:

Duration of Labor:

C Section Rate:

Induction Rate