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The Effectiveness of Non-pharmacological Touch Therapies in Labor

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Abstract

Background/Purpose: The purpose of this paper is to critically analyze literature in order to determine the effectiveness of non-pharmacological touch therapies during labor. The touch therapies included in this literature review are acupuncture, acupressure, massage, and sterile water injections. The specific outcomes studies are labor pain, duration of labor, labor progress, mode of delivery, maternal satisfaction, and neonatal outcomes.

Theoretical Framework: The Modeling and Role Modeling Theory can be used as a foundation for the utilization of non-pharmacological touch therapies in labor. This theory is a self-care model based on the clinical perception of the world and adaptations to stressors (Petiprin, 2016). According to the theory, the nurse's roles are to facilitate, nurture, and provide unconditional acceptance while building trust, promoting patient's control and strengths, and setting mutual health-directed goals (Petiprin, 2016).

Methods: Databases used to search for literature pertaining to the effectiveness of non-pharmacological touch therapies in labor were CINAHL, google scholar, and EBSCOhost. Twenty studies published between 2008 and 2018 were chosen. Nineteen are randomized controlled trials and one is a quasi-experimental study. No research on these particular interventions occurred in the United States, so international locations were used.

Results/Findings: Thirteen of the articles utilized reduction of labor pain as a primary outcome of their study. All but one study found a statistically significant reduction in labor pain when comparing the interventions to a control group. A total of eighteen studies addressed duration of labor and labor process as an outcome. Ten studies revealed significant results showing that non-pharmacological interventions can be a good alternative for shortening the duration of labor and assisting with uterine contractions. Eight randomized controlled trials addressed the method

of delivery with only one study showing a statistically significant difference in lowering cesarean section rates. Three studies addressed maternal satisfaction with all three finding statistically significant differences. Lastly, ten studies reviewed neonatal outcomes with one study finding significantly improved results.

Implications for Research and Practice: Providers are encouraged to attend course to learn and develop the skills to be able to use non-pharmacological interventions when care for the laboring woman. With proper training and education nurse-midwives can meet their client's desires of achieving a holistic birth. It is important to understand the benefits of non-pharmacological interventions as well as educate women on all their options. Non-pharmacological interventions can be used in the hospital, birth center, and home setting and can be used in combination with pharmacological options.

Keywords: labor, massage, acupuncture, acupressure, sterile water injections, non-pharmacological interventions, and randomized controlled trial

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Chapter One: Introduction

Obstetric interventions have become the norm in the United States. In 2017, 26% of women were induced, 21% of women had their labors augmented, 74% received either an epidural or spinal anesthesia for pain, and 32 % were delivered by cesarean sections (Centers for Disease Control and Prevention [CDC], 2018). Although these interventions may be successful, they come with risks for both the woman and her fetus. Epidurals may be an effective form of pain control, but they can cause a woman's blood pressure to drop, a severe headache to develop from leakage of spinal fluid, labor dystocia, shivering, a ringing in the ears, backache, nausea, difficulty urinating, difficulty with pushing, numbness in the lower half of the body for a few hours after birth, and although rare, permanent nerve damage where the epidural catheter was inserted (American Pregnancy Association, 2017). Issues can also arise for the baby during labor, at birth, and after birth. These include fetal malpositioning, an increase in fetal heart rate variability, potential for respiratory depression, and difficulty with latching during breastfeeding (American Pregnancy Association, 2017). Induction or augmentation of labor with either pharmacologic or mechanical agents increases the risk for postpartum hemorrhages which in turn causes a cascade of risks including blood transfusions, hysterectomy, placenta implantation abnormalities in future pregnancies, a longer hospital stay, more hospital re-admissions, and occasionally death. It also increases the risk of cesarean birth which increases risk for infection, deep vein thrombosis, and life-long pain from abdominal adhesions (Association of Women's Health, Obstetric and Neonatal Nurses [AWHONN], 2014). The fetus can respond to induction or augmentation with an increase in fetal stress, more neonatal respiratory illness, an increase in separation from the mother causing interrupted bonding, less breastfeeding, more admissions to

neonatal intensive care unit, longer hospital stays, and more re-admissions to the hospital (AWHONN, 2014).

Women are searching for more holistic options without the use of unnecessary medical interventions. Unfortunately, when it comes to birthing in a hospital, childbirth is looked at as a state of illness instead of wellness. Of the 98.8% of women who birth in the hospital, 85% are considered low-risk making them eligible for few to no interventions yet they are still having to undergo multiple interventions such as continuous electronic fetal monitoring, intravenous fluids, having labor medically accelerated, and having labor artificially induced (Stapleton, Osborne, & Illuzzi, 2013). When a laboring woman is cared for in this way, her personal autonomy, her independence, and her right to make decisions about her baby's birth are taken from her. These same authors identify that women in labor want to be informed of the different options they have, to be able to participate in the decision-making process, and not to receive unnecessary or undesired interventions.

Pain reduction and labor augmentation often do become necessary during labor. This paper will discuss alternative options that may provide similar outcomes as medical interventions yet allowing her to have choices in the decision-making process. Touch therapies are interventions in which the provider places their hands on the individual in a specific way. These can be used as alternative and non-pharmacologic interventions that do not provide negative side effects to the mother or baby.

Throughout pregnancy, but especially from the onset of labor to the delivery of the baby, a woman goes through biological, physiological, emotional, and sociological changes (Yildirim, Alan, & Gokyildiz, 2018). Achieving a normal physiologic childbirth provides many short- and long-term health benefits. These include better physical and emotional health after childbirth

and improved capacity to mother her child for the woman. For the infant, benefits include lack of exposure to medications, plus enhanced infant growth and development (American College of Nurse-Midwives [ACNM], Midwives Alliance North America [MANA], & National Association of Certified Professional Midwives [NACPM], 2012). ACNM, MANA, and NACMP (2012) define normal physiologic childbirth as a "birth that is powered by the innate human capacity of the woman and fetus." Inducing or augmenting labor, using pain medications, regional analgesia, episiotomies, and operative vaginal or abdominal birth are all factors that can disrupt the normal physiologic childbirth (ACNM, MANA, & NACPM, 2012).

The utilization of non-pharmacological touch interventions such as acupuncture, acupressure, massage, and sterile water injections can support the woman in labor in a more holistic manner. Both acupuncture and acupressure come from traditional Chinese medicine. The stated purpose is to maintain a balance between the yin and the yang energy in the meridians that circulate through the body. These meridians link to target organs where either pressure is applied or fine needles are placed (Mafetoni & Shimo, 2015). Massage is an old technique used to provide relaxation by rubbing or kneading certain muscles in the body with the hands (Bolbol-Haghighi, Masoumi, & Kazemi, 2016). Sterile water injections are either intradermal, subcutaneous, or intracutaneous injections placed in four different sites in the lumbosacral region and use the gate control theory to relieve referred pain (Saxena, Nischal, & Batra, 2009). This paper will provide a critical review of literature to answer the question, "What is the effectiveness of non-pharmacological touch interventions in labor?"

Statement of Purpose

The purpose of this paper is to review scholarly articles in order to determine the effectiveness of non-pharmacological touch therapies used during labor. Specific non-

pharmacological interventions being examined are massage, acupuncture, acupressure, and sterile water injections. While conducting the literature review, specific outcomes were chosen to determine effectiveness of the four interventions. These outcomes consist of birth pain, duration of labor, labor progress, APGAR scores, type of delivery, post labor pain, cervical ripening/initiation of labor, contraction times, and women's satisfaction of experience.

Need for a Critical Review

An increasing number of women are interested in achieving a natural childbirth using non-invasive interventions. These healthy women are wishing to take fewer medications; however, pharmacological interventions are still being encouraged by providers. According to ACNM, MANA, & NACPM (2012), it has become normal for obstetric interventions to be used during a labor and birth with over half of women in the United States are being induced or augmented with Oxytocin and a third of women requiring a cesarean nationally. When one intervention is used the demand for additional inventions increases. Maternal mortality in the United States accounts for 20.7 deaths per 100,000 live births while infant mortality is 5.9 deaths per 1,000 live births (America's Health Rankings, 2018). Although it is not the focus of this paper, it is recognized that the United States is ranked 46th in the world for maternal mortality. Unfortunately, the United States is the only developed country showing an increase in death rate (America's Health Rankings, 2018). It would not be unreasonable to consider that the risks of unnecessary medical interventions contribute to that. Better knowledge related to non-pharmacological interventions during labor can assist in achieving a physiologic birth without the use of unnecessary interventions.

Pharmacological interventions increase cost, produce unwanted side effects for both mother and fetus, and make the woman feel like she is not in control. Non-pharmacological options are low cost, safe, side effect free, do not slow down labor, and make the woman feel in control of the situation (Hamid, Obaya, & Gaafar, 2013).

In the United States, the average cost of a vaginal delivery in the hospital, with no complications and no interventions is $4,485 after insurance has paid. However, depending on the state you live in, prices could reach $12,000. Adding an epidural can cost on average another $2,132 (Xu, Gariepy, Lundsberg, Sheth, Pettker, Krumholz, & Illuzzi, 2015).

According to ACOG (2017), systemic analgesics known as opioids can be given to assist with pain during labor. Side effects associated with these pharmacological agents for the women can include itching, nausea, vomiting, drowsiness, and trouble concentrating. These agents can also have an affect on the baby's breathing and heart rate for a short amount of time as well as cause them to be drowsy making it hard for them to breastfeed (ACOG, 2017).

Another pharmacological option for pain control is regional analgesia, also known as an epidural or spinal. Along with the previously mentioned risks associated with epidurals, ACOG (2017) mentions other side effects that can occur. The most common side effect is itching which can be treated with another medication such as Diphenhydramine. Other side effects that can occur are nausea, vomiting, breathing problems (ACOG, 2017).

With an understanding of the effectiveness of non-pharmacological interventions during labor, providers can eliminate or reduce the need for pharmacological interventions thus keeping mothers and their babies in good health (Hamlact & Yazici, 2017).

Significance to Nurse-Midwifery

As of 2017 there were 11,826 certified nurse midwives in the United States (ACNM, 2016). Certified nurse-midwives are advanced practice nurses with a master's degree who are trained in caring for women during pregnancy and childbirth as well as providing gynecological care throughout the woman's life. Midwives support women during healthy pregnancies and facilitate in the normal childbirth process. Viewing pregnancy and birth as a normal healthy process, nurse-midwives strive to provide the woman with a safe birth for herself and her baby with as little medical intervention as possible.

The hallmarks of midwifery are essential characteristics for the practicing registered nurse midwife to follow (ACNM, 2012). Among the hallmarks addressed in this paper are to advocate for non-interventions in the healthy women, to incorporate scientific evidence into practice, to empower women as partners in their care, and to evaluate and incorporate complementary and alternative therapies into practice (ACNM, 2012). It is the duty of the nurse-midwife to provide the woman with a safe labor for her and her baby as well as provide a positive birth experience (Yildirim et al., 2018).

A position statement by ACNM (2014) regarding appropriate use of technology in childbirth states that midwives are highly encouraged to practice continuity of care, provide safe, evidence-based, and competent care, advocate for non-intervention when labor is normal, promote health education during pregnancy and labor, and support all women as partners in their care. With this goal in mind, the use of non-pharmacological interventions for comfort in labor that have been determined to be safe and efficient is supported by the ACNM (2014).

According to ACNM, MANA, and NACPM (2012), in order to provide better care and better health to our patients, providers need to learn how to avoid the use of unnecessary interventions and learn how to protect, provide, and support human childbearing during a normal

physiologic birth. When resources are provided to aid in a more natural approach during labor, it not only benefits the mothers but also their infants. When women feel physically and emotionally healthy, they are able to better respond to their infants' needs. Infants benefit from lack of exposure to medications that could cause issues with neurological behavior (ACNM, MANA, & NACPM, 2012).

An example of an intervention that is overused in obstetrical care is continuous electronic fetal monitoring. Fetal monitoring was introduced to hospitals in the 1970s with thoughts that it would be able to predict fetal distress as well as bring an end to cerebral palsy. Continuous electronic fetal monitoring lacks evidence on its benefits; however, it is used on approximately 90% of laboring women (Dekker, 2018). Since its introduction into the obstetrical community, it has not improved infant or maternal outcomes. The American Academy of Nursing (2015) asserts that when compared to intermittent monitoring, 63% of women were more likely to have a cesarean delivery and 15% were more likely to have vacuum or forceps assisted delivery. The Academy also reports a reduction in the women's mobility while on continuous monitoring, which in turn decreases her ability to cope with labor pain and can increase the duration of her labor (American Academy of Nursing, 2015).

Theoretical Framework

The Modeling and Role Modeling Theory was developed in 1983 by Helen Erickson, Evelyn Tomlin, and Mary Ann Swain and is described both as a theory and a paradigm (McEwen & Wills, 2011). The theorists believe that the profession of nursing is both an art and a science, and only when fused together will there be an enhancement in a client's health. This is a self-care model based on the client's perception of the world and adaptations to stressors (Walsh, VandenBosch, & Boehm, 1989). The Modeling and Role Modeling Theory integrates

several theories including Maslow's Theory of Hierarchy of Needs, Erikson's Theory of Psychological Stages, Piaget's Theory of Cognitive Development, and Seyle and Lazarus's General Adaptation Syndrome (Petiprin, 2016). Erickson, Tomlin, and Swain believe that although people are alike because of their holism, lifetime growth, and development, they are also different because of inherent endowment, adaptation, and self-care knowledge (Petiprin, 2016).

This theory consists of two stages: the modeling stage and the role-modeling stage. In the modeling stage it is the nurse's responsibility to understand the patient's unique perspective of his/her own world and appreciate the significance of this. In the role modeling stage, the nurse attains, maintains, and promotes health by accepting that the patient is the expert in their own care and plans interventions that meet their unique perspectives. The nurse's roles are to facilitate, nurture, and provide unconditional acceptance while building trust, promoting the patient's positive orientation, promoting the patient's control, affirming and promoting the patient's strengths, and setting mutual, health-directed goals (Petiprin, 2016).

The modeling and role-modeling theory is an appropriate foundation for this research question for many reasons. The theory utilizes a holistic approach that incorporates the mind, body, and spirit as a unit, which is the same philosophy as complementary therapies (Petiprin, 2016). Part of the nurse's job in the role modeling stage is to nurture the patient. Touch by the provider can be a great source of nurturing so long as it falls within the model of the client's world. In order to meet the requirements of this theory, it is essential for interaction and communication to occur between both the nurse and client. This makes it possible for the nurse to gather information on the client's individual views of their situation, their goals, their expectations, and their strengths so that they can model that client's world. This will help to

ensure that there is an understanding of the patient's personal perspective on the birth process and what their desires are. The CNM must understand the woman's wishes in order to provide safe interventions that move towards her health-directed goals. It is imperative for the patient to be in control of her own birth as much as possible. By understanding their strengths, providing them with care and comfort, and accepting the decisions that they make the CNM can aid in that. Providing the patient with the alternatives to pharmacological interventions and helping her achieve the confidence of being able to accomplish her goal builds trust, provides a positive orientation, and helps the patient stay in control.

An important aspect of this literature review is discovering how effective touch therapies are at reducing labor pain. Modeling and Role Modeling Theory believes that individuals are born wanting to grow and fulfill their self-potential; however, when the individual does not feel safe, secure, and supported their growth is threatened (Walsh et al., 1989). Non-pharmacological interventions aid in pain management by reducing the intensity of pain, increasing pain tolerance, reducing pain-related distress, strengthening coping abilities, and giving the patient a sense of control over the pain (Mwanza, Gwisai, & Munemo, 2019). This allows the woman to feel safe and supported whereas pharmacological methods just decrease the sensation of pain.

Summary

Many women want to experience a natural childbirth, yet many providers are uncertain of resources to provide to these women so that they can fulfill this goal. As providers gain more knowledge on the effectiveness of non-pharmacological interventions there will be more opportunity for them to assist women in achieving a physiologic birth. Using the modeling and role-modeling theory as a foundation will help to guide the midwife towards a holistic approach

where patient specific interventions are chosen to care for the woman, increasing her confidence, building trust, and helping her to be in control of her labor.

Chapter II: Methods

This chapter addresses the methods used to identify and appraise scholarly literature in order to determine the effectiveness of four non-pharmacological touch interventions in labor. Multiple research databases and search terms were used which generated 89 research articles. The articles were assessed for their significance to the review and the final 20 articles were selected when inclusion and exclusion criteria were met.

Search Strategies

The purpose of this literature review was to answer the practice question: what is the effectiveness of non-pharmacological touch interventions in labor? Incorporated studies were dated between the years 2008 and 2018. The following databases were used: The Cumulative Index to Nursing and Allied Health Literature (CINAHL), CINAHL Plus, Google Scholar, and EBSCOhost. Search terms included: labor, massage, acupuncture, acupressure, sterile water injections, non-pharmacological interventions, and randomized controlled trial.

Inclusion and Exclusion Criteria

The studies selected for this literature review addressed non-pharmacological touch interventions in labor and their effectiveness. Included research articles utilized interventions such as massage, acupressure, acupuncture, and sterile water injections. These four specific interventions were used as inclusion criteria due to midwives believing in high touch and low-technology interventions. To ensure the use of the most uptodate information, all articles needed to be published within the last 10 years. Articles included in this review consisted of studies done in developed countries and were randomized controlled trials. No research done in the United States regarding these specific non-pharmacological interventions in labor was identified. Thus, international locations were chosen as inclusion criteria for this review.

Exclusion criteria eliminated studies that included other non-pharmacological interventions used in labor. Studies older than 10 years were also excluded from the literature review. Additionally, studies were excluded if they were conducted in third world countries, were in a language other than English, and research completed on women outside of labor.

Studies Selected

The initial database search yielded 89 studies. After utilizing inclusion criteria, 20 research articles were selected to be included in the review. All studies were published between the years of 2008 and 2018 with 19 studies being randomized controlled trials and 1 a quasi-experimental study. The research took place in the Middle East, Africa, Asia, South America, Europe, and Australia. Of the studies, one took place in Australia, two in Brazil, one in China, one in Denmark, two in Egypt, one in India, seven in Iran, one in Nepal, and four in Turkey.

Evaluation Criteria

Each study was evaluated and appraised using the *Johns Hopkins Nursing Evidence-Based Practice: Model and Guidelines* (2012) for level of evidence and quality. An evidence level scale of I-IV was used to appraise the 20 selected articles. Level I evidence is of the highest strength studies and includes randomized controlled trials (RCTs) and systematic reviews of RCTs with or without meta-analysis (Dearholt & Dang, 2012). Studies that belong in level II evidence consists of quasi-experimental studies and systematic reviews of a combination of RCTs and quasi-experimental, or quasi-experimental studies only, with or without meta-analysis (Dearholt & Dang, 2012). Those studies that are included in level III evidence are non-experimental studies and systematic reviews of a combination of RCTs, quasi-experimental and non-experimental studies, or non-experimental studies only, with or without meta-analysis, or qualitative studies and systematic reviews with or without a meta-synthesis (Dearholt & Dang,

2012). The last level, level IV consists of clinical practice guidelines and consensus panels that are based off of scientific evidence (Dearholt & Dang, 2012). Nineteen of the chosen research articles for this review were considered level I evidence, and one was considered level II evidence.

After evaluating the research articles for level of evidence, they were reviewed for quality. Quality was rated either high quality, good quality, or low quality including those with major flaws. Those articles rated high quality had a sufficient sample size needed for the study design, good control, consistent results, and definitive conclusion with consistent recommendations based on comprehensive literature review with most studies being from the last 5 years (Dearholt & Dang, 2012). Good quality articles have a sufficient sample size needed for the study, some control, reasonably consistent results, and reasonably consistent recommendations based on fairly comprehensive literature reviews (Dearholt & Dang, 2012). Low quality studies have an insufficient sample size, little to no evidence with inconsistent results, and no conclusions could be drawn (Dearholt & Dang, 2012). Out of the 20 chosen articles for this review, two articles met criteria for a high-quality rating and eighteen articles met criteria for a good quality rating.

Summary

Databases were searched utilizing the online library system at Bethel University along with Google to compile articles that addressed non-pharmacological touch interventions in labor and their effectiveness. Inclusion and exclusion criteria were added to the search to narrow the results to 20 of the most significant articles for the review. The articles were then evaluated and appraised for level of evidence and quality using the Johns Hopkin Research Evidence Appraisal Tool.

Chapter III: Literature Review and Analysis

Synthesis of Matrix

A matrix format was used to organize scholarly articles and to find the significant outcomes of using non-pharmacological touch therapies in labor. Included in the matrix are nineteen randomized controlled trials and one quasi-experimental study. The John Hopkins Research Evidence Appraisal Tool was used to evaluate the level of evidence as well as the quality of each research article (Dearholt & Dang, 2012). The matrix provides information on the purpose of the study, descriptions of the samples and settings, the study design, the instruments used, pertinent findings, strengths and limitation, implications for practice, recommendations for future research, and the level of evidence and quality assigned to each article. The matrix is organized by specific touch therapy and the pertinent findings are evaluated and summarized in chapter three. The analyzed data within the matrix is included in Appendix A.

Synthesis of Major Findings

The effectiveness of non-pharmacological touch therapies in labor was evaluated. The scholarly articles appraised in this review examine the impact of non-pharmacological touch therapies on labor pain, duration of labor in both the first and second stage, labor process, the need for pharmacologic pain management, patient satisfaction, maternal behaviors during labor, and neonatal outcomes. Out of the twenty articles reviewed, five examined the effectiveness of acupuncture, nine examined the effectiveness of acupressure, three examined the effectiveness of massage, and three examined the effectiveness of sterile water injections. The synthesis of major findings regarding the effectiveness of touch therapies in labor will address the following:

reduction of pain, duration of labor, labor process, the method of delivery, patient satisfaction and behaviors during labor, and neonatal outcomes.

Reduction of pain.

Labor pain is considered one of if not the most severe pain physically, emotionally, and psychologically a woman will ever experience. Pain that is left uncontrolled can cause discomfort not only for the woman but also for the fetus. Pharmacological interventions have increasingly become the approach for pain management during labor; however, there has been a growing interest in non-pharmacological approaches due to the potential side effects caused by the pharmacological methods to both the mother and baby (Ozgoli, Mobarakabadi, Heshmat, Majd, & Sheikhan, 2016). Thirteen of the reviewed studies addressed the effectiveness of touch therapies on the reduction of labor pain; two utilized massage, three utilized sterile water injections, six utilized acupressure, and two utilized acupuncture (Afefy, 2015; Asadi et al., 2015; Dabiri & Shahi, 2014; Dong, Hu, Liang, & Zhang, 2015; Erdogan & Yanikkerem, 2017; Hamid, Obaya, & Gaafar, 2013; Hamlact & Yazici, 2017; Koyucu et al., 2018; Mansouri, Kordi, Shakeri, & Mirteimouri, 2018; Ozgoli et al., 2016; Rai, Uprety, Pradhan, Bhattarai, & Acharya, 2013; Saxena, Nischal, & Batra, 2009; Yildirim, Alan, & Gokyildiz, 2018). All of the studies used the Visual Analogue Scale (VAS) of either 0-10 or 0-100 to assess for pain before, during, and after the interventions. Twelve of the studies determined that touch therapies can significantly reduce labor pain when compared to a control group. Only one study using acupuncture determined that pain was not reduced to a statistically significant level. Even so, there was a small decrease in pain score when compared to the control group. The findings of the thirteen studies that focused on labor pain will be addressed throughout the following paragraphs.

Massage.

Massage has been used for many years to aid in relaxation and to ease aches and pains; however, there has been little research on its effect during labor. Erdogan & Yanikkerem (2017) examined the effects of massage to the back, shoulders, and arms for 30 minutes at 3-4 cm dilated, 5-7 cm dilated, and 8-10 cm dilated on perceived birth pain. Healthy, term, pregnant women (N=62) with a singleton vertex fetus at >/= 4 cm dilated with no pregnancy complications and expecting a spontaneous vaginal delivery were included in this study which was done in Turkey. Half were assigned to the experimental group and the other half to a control group receiving routine care. Erdogen and Yanikkerem (2017) concluded that massage significantly reduced low back pain in all three phases. Using a VAS scale of 0-10, results of this study included: VAS scores at 3-4 cm (massage: 5.2±0.9, control: 7.3±1.3; P=0.000), VAS scores at 5-7 cm (massage: 6.6±1.6, control: 8.8±1.0; P=0.000), and VAS scores at 8-10cm (massage: 6.7±2.7, control: 9.2±2.4; P=0.000) (Erdogen & Yanikkerem, 2017).

That was not the only study that found massage to be effective at reducing labor pain. A randomized controlled trial (N=300) by Afefy (2015) which took place in Egypt compared ice cold massage to both an acupressure group and a control group. All women had a healthy singleton term pregnancy, were between the ages of 20-30, and were primigravida, nulliparous, with intact membranes. They were in the early active phase of labor and were randomized into groups with 100 in each. For 20 minutes during contractions in the active phase of labor, ice cold massage was applied to the Hugo point (LI4) during contractions for 1-minute on and 1-minute rest. For comparison, an acupressure group received only pressure to the Hugo point and a control group received routine hospital care. Upon completion of this study, Afefy (2015) discovered there was a significant decrease in pain immediately after the intervention ($p<0.003$),

30 minutes after intervention ($p<0.002$), and 1-hour post-intervention ($P<0.02$) when comparing all three groups. Ice massage was found to more beneficial than acupressure although both were effective (Afefy, 2015).

Sterile water injections.

Thirty percent of women experience low back pain during labor (Rai et al., 2013). The pain these women are experiencing is thought to be referred pain coming from the uterine cervix and corpus which are supplied by afferent neurons that end in the dorsal horns of the spinal segments T10—L1 (Saxena et al., 2009). According to Saxena et al. (2009), sterile water injections work by a mechanism of counter-irritation by irritating the skin in the same dermatomal distribution of the pain felt. All three of the studies utilizing sterile water injections for pain relief found a significant reduction in pain when compared to a control group (Koyucu et al., 2018; Rai et al., 2013; Saxena et al., 2009). These studies took place in Nepal, Turkey, and India with sample sizes ranging from 100-240. All were healthy singleton term pregnant women in the active phase of labor with severe lower back pain who had not received any other analgesics for the pain. All three studies injected four sterile water papules around the rhombus of Michaelis and were compared to a control group receiving injections of isotonic saline given in the same way.

Rai et al. (2013) studied subcutaneous sterile water injections; pain was monitored using a VAS of 0-10 before the injections as well as post-injection at 10 minutes, at 45 minutes, and at 90 minutes. There was no difference in pain scores before the intervention. Pain scores were significantly decreased at 10 minutes, 45 minutes, and 90 minutes in the subcutaneous sterile water injection group when compared to the control group. All three intervals yielded a p-value of <0.001 with results of 3.64 ± 2.93 in the intervention group and 7.63 ± 2.16 in the control

group at 10 minutes, 3.27 ± 2.68 in the intervention group and 7.69 ± 2.28 in the control group at 45 minutes, and 3.32 ± 2.68 in the intervention group and 4.63 ± 0.82 in the control group at 90 minutes (Rai et al., 2013).

According to the randomized controlled trial conducted by Saxena et al. (2009), sterile water injections are effective at reducing low back pain with an effect lasting 45-90 minutes. Intracutaneous sterile water injections were used in this study and pain was assessed using a VAS of 0-100 before the intervention, 10 minutes after, 45 minutes after, and 90 minutes after intervention. When compared to the pain score prior to the intervention, it was found that the sterile water injection group had a significant decrease in low back pain at all time intervals ($p<0.005$) whereas there was no significant difference in pain in the control group who received isotonic saline when compared to the pain score prior to the intervention. Results for the sterile water injection group are as follows: 10 minutes 34.2 ± 28.70, 45 minutes 33.2 ± 32.67, and 90 minutes 49.3 ± 33.96. Low back pain was also found to be significantly reduced when compared to the control group ($p<0.05$).

Koyucu et al. (2018) studied the use of intradermal sterile water injections which were administered at the peak point of contractions. Pain was assessed for up to three hours after the intervention, whereas the other studies only assessed pain for one and a half hours. This study in Turkey also showed a reduction in back pain caused by labor at 10 minutes ($p<0.01$), 30 minutes ($p<0.01$), 60 minutes ($p<0.01$), 120 minutes ($p<0.01$), and 180 minutes ($p<0.01$) when compared to the control group who received dry injections. In addition to looking at the effects intradermal sterile water injections had on pain, Koyucu et al. (2018) also looked at its effect on women getting epidurals. Those results showed that there was not a significant difference on the number

women who eventually received an epidural when comparing the two groups (sterile water group: 4.76%, dry injection group: 9.52%, p=0.231).

Acupressure.

Acupressure is a form of traditional Chinese medicine that stimulates specific energy points on the body to aid in healing. Dabiri and Shahi (2014) explain that acupressure works on the gate control theory by "stimulating the large fibers responsible for transmitting nerve impulses to the spinal cord" which results in keeping the pain transmission closed leading to a decrease in pain. Six articles examined the effectiveness of acupressure on reducing pain in labor and all produced significant results (Dabiri & Shahi, 2014; Hamid et al., 2013; Hamlact & Yazici, 2017; Mansouri et al., 2018; Ozgoli et al., 2016; Yildirim et al., 2018).

Concentrating on the Hugo point (LI4), the point between the first and second carpal bones on the back of the hand, Hamlact and Yazici (2017) studied healthy singleton term pregnant women (N=88) with an estimated fetal weight of 2500 to 4000 grams who went into labor spontaneously and had a cervix less than 5 cm to determine its effectiveness on labor pain. This study which was done in Turkey, found that labor pain was significantly decreased when acupressure was applied to the Hugo point bilaterally 8 times at 4-5 cm dilated (p=.0001) and 8 times at 7-8 cm dilated (p=.0001) at a pressure of 3-5kg when compared to a control group receiving routine healthcare. The results were assessed using a VAS of 0-10 and were as follows: study group 3.77 ± 1.3 and control group 6.22 ± 1.14 at 4-5 cm dilate and study group 7.57 ± 1.27 and control group 8.61 ± 0.71 at 7-8 cm dilated (Hamlact & Yazici, 2017).

Dabiri and Shahi (2014) also conducted their study (N=149) only using the Hugo point; however, they decided to compare it to both a touch group and a control group who received traditional care. Bilateral pressure that was applied for 60 seconds with a 60 second rest for 30

minutes showed a significant decrease in pain at 30 minutes after the intervention and 60 minutes after the intervention when compared to before the intervention ($p=0.110$) whereas pain was increased in both the touch group ($p<0.001$) and the control group ($p<0.001$).

These findings were reinforced by a randomized controlled trial (N=72) that took place in Turkey by Yildirim et al. (2018) which found that ice pressure to the Hugo point (LI4) can reduce labor pain. Ice pressure applied to LI4 bilaterally at the start of each contraction and through the contraction for 80 minutes with rest periods between contractions significantly decreased pain at 40 minutes post-intervention and 80 minutes post-intervention ($p=0.001$) when comparing the results to a control group and to pre-intervention scores. Before application, VAS scores from 0-10 were control group 6.33 and experimental group 7.33, at 40 minutes after application control group 7.28 and experimental group 7.11, and at 80 minutes after application control group 8.61 and experimental group 5.25 (Yildirim et al., 2018).

The three other studies provided research on acupressure locations other than Hugo (LI4) or added other acupressure points in addition to the Hugo point. Mansouri et al. (2018) compared the effect of acupressure on bladder-GV20 (n=55) to acupressure on gallbladder-GV20 (n=55) and a control group (n=55). During the first stage of labor for 60 seconds in each location for a total of five 4-minute cycles at the onset of a uterine contraction and again during the second stage of labor for one 4-minute cycle acupressure to the bladder-GV20 sites were applied. The same was done on the gallbladder-GV20 sites except since there was one less site a total of four 5-minute cycles were done in the first stage and one 4-minute cycle was done in the second stage. This study taking place in Iran included healthy primiparous term women (N=165) aged 18-35 with a singleton vertex fetus, with no pregnancy complications, an estimated fetal weight of 2500-4000 grams, at 4-5 cm dilated with at least 2 contractions in 10 minutes, and pain

intensity of >/= 50 mm. When compared to a control group receiving routine healthcare, there was a significant decrease in pain throughout the three groups immediately after intervention and 30 minutes after intervention during the first stage of labor ($p<0.001$). Pain was assessed using a VAS of 0-100. Immediately after the intervention the results were 33.2 ± 7.4 in the bladder group, 24.2 ± 6.0 in the gallbladder group, and 83.2 ± 10.1 in the control group and at 30 minutes post-intervention the results were 71.5 ± 8.1 in the bladder group, 59.5 ± 6.4 in the gallbladder group, and 87.5 ± 8.7 in the control group (Mansouri et al., 2018). It was determined that the group receiving acupressure to the gallbladder-GV20 had the lowest pain intensity at 30 minutes post-intervention ($p<0.001$) and all through the second stage of labor ($p<0.05$) when compared to both the bladder-GV20 group and control group.

According to the randomized controlled trial (N=105) conducted in Iran by Ozgoli et al. (2016), acupressure at points LI4 and BL32 are effective at reducing labor pain with acupressure at BL32 being slightly more effective in the first stage of labor. The LI4 group received acupressure to the right hand at the start of a contraction and stopped at the end of the contraction for 6 times at 4-5 cm dilated, 6-7 cm dilated, and 8-10 cm dilated. The BL32 received acupressure bilaterally in the same manner as the LI4 group and the control group received traditional care. Results of this study included: LI4 compared to control group at 4-5 cm dilated ($p=0.001$), at 6-7 cm dilated ($p=0.001$), and at 8-10 cm dilated ($p=0.001$), BL32 compared to control group at 4-5 cm dilated ($p=0.001$), at 6-7 cm dilated ($p=0.001$), and at 8-10 cm dilated ($p=0.001$), and LI4 compared to BL32 at 4-5 cm dilated ($p=0.01$), at 6-7 cm dilated ($p=0.03$), and at 8-10 cm dilated there was no significant difference ($p=0.18$).

Hamid et al. (2013) conducted a quasi-experimental study in Egypt with healthy primiparous singleton term pregnant women (N=100) aged 20-30 in early active labor with intact

membranes looking at how effective acupressure to the sanyinjiao point (SP6) bilaterally for one minute during each contraction for a total of 30 minutes was at reducing labor pain for the primigravida compared to a control group. The study found that there was a significant decrease in pain immediately after the intervention (t=-4.45, p=0.004), at 30 minutes post-intervention (t=-3.9, p=0.002), at 60 minutes post-intervention (p=0.02), and at 120 minutes post-intervention (p=0.03). Along with examining the effectiveness on reduction of pain, the study also looked at the need for administering analgesia with results showing a significant decrease in need in the acupressure group when compared to the control group (88% did not receive analgesia in the acupressure group and 56% in the control group (p=0.001)) (Hamid et al., 2013).

Acupuncture.

Acupuncture has been used since ancient times in China to relieve pains. This non-pharmacological method works in the same way as acupressure for relief of pain. Specific body points are stimulated and manipulated using fine needles (Asadi et al., 2015). Two articles researched the effectiveness of acupuncture on labor pain with one showing significant results and one not (Dong et al., 2015; Asadi et al., 2015). Both studies utilized the SP6 point with one comparing it to LI4 and the other comparing it to EX-B2. Healthy nulliparous term singleton pregnant women with no pregnancy complications were included in both of these studies.

Dong et al. (2015) studied women (N=180) in China examining the effect of electro-acupuncture starting a 15 mA and adjusted when requested by the patient at EX-B2 and SP6 on labor pain. At the conclusion of the study, it was determined that electro-acupuncture to these two points can significantly reduce pain when compared to a control group who received traditional healthcare. Before the start of intervention, the pain scores using a VAS of 0-10 were similar among the three groups (EX-B2 group: 7.71 ± 1.26, SP6 group: 7.98 ± 1.19, control

group 7.80 ± 1.19, $p>0.05$). When comparing the two acupuncture groups to the control group at 30 minutes post intervention it was found that there was a significant decrease in labor pain (EX-B2 group: 6.70 ± 1.28, SP6 group: 6.57 ± 1.42, control group: 7.85 ± 1.22, $p<0.01$) but when each acupuncture group was compared to one another there was no significant difference found ($p>0.05$). However, at 60 and 120 minutes post intervention there was a significant difference in pain reduction between the two acupuncture groups ($p<0.05$) with the EX-B2 group having a lower score which was also the same when compared to the control group (60 min: EX-B2 group: 5.57 ± 1.11, SP6 group: 6.05 ± 1.08, control group: 7.88 ± 1.14; 120 min: EX-B2: 6.15 ± 1.18, SP6 group: 6.59 ± 1.09, control group: 8.16 ± 0.95) (Dong et al., 2015).

In contrast, a randomized controlled study (N=63) conducted in Iran by Asadi et al. (2015) found that acupuncture at LI4 and SP6 for 20 minutes with the needles being rotated clockwise every 5 minutes was not effective at reducing labor pain when compared to a control group that received sham acupuncture. Results of this study for pain scores using a VAS of 0-10 included: before intervention in the acupuncture group 7.6 and in the control group 7.3 ($p=0.470$) and after the intervention in the acupuncture group 2.38 and in the control group 2.50 ($p=0.850$) (Asadi et al., 2015). Although concluded not to produce a statistically significant difference, there was a slightly greater decrease in labor pain in the intervention group than in the control group. This showed that women can benefit from acupuncture for labor pain.

Duration of labor and labor process.

With labor comes anxiety of the unknown which in turn increases catecholamine secretion which reduces the blood supply to the uterus, decreases the effectiveness of uterine contractions, and thus can increase the labor duration (Bolbol-Haghighi, Masoumi, & Kazemi, 2016). When the duration of labor is prolonged, it puts both the mother and her fetus at risk.

Maternal risks are postpartum hemorrhage, infection, and psychological distress while fetal risks are death, choking, infection, and neural and physical damages (Bolbol-Haghighi et al., 2016). In fact, pain and duration of labor can go hand-and-hand with pain causing anxiety and anxiety causing a decrease in uterine contractions. Pharmacological methods have been proven to help shorten the duration of labor and increase contractions; however, these methods do not treat the person as a whole and there are potential side effects.

Eighteen studies addressed the effectiveness of touch interventions on the duration of labor and labor process (Afefy, 2015; Bolbol-Haghighi et al., 2016; Asadi et al., 2015; Dabiri & Shahi, 2014; Dong et al., 2015; Erdogen &Yanikkerem, 2017; Gribel, Coca-Velarde, & Moreira de Sa, 2011; Hamid et al., 2016; Hamlact &Yazici, 2017; Koyucu et al., 2018; Mafetoni & Shimo, 2015; Mansouri et al., 2018; Modlock, Nielson, & Uldbjerg, 2010; Saxena at al., 2009; Smith, Crowther, Collins, & Coyle, 2008; Torkzahrani, Ghobadi, Heshmat, Shakeri, &Aria, 2015; Torkzahrani, Mahmoudikohani, Saatchi, Sefidkar, & Banaei, 2017; Yildirim et al., 2018). Ten studies revealed significant results showing that non-pharmacological interventions can be a good alternative for shortening the duration of labor and assisting with uterine contractions. The findings of these eighteen studies will be addressed throughout the following paragraphs.

Massage.

Massage works on reducing the adrenaline and noradrenaline secretion to decrease pain and to increase both endorphins and oxytocin release (Bolbol-Haghighi et al., 2016). This assists in increasing uterine contractions thus reducing the duration of labor.

Along with the previously mentioned results of the study conducted by Afefy (2015) on the reduction of pain, the study also concluded that ice massage, as well as acupressure, is successful in significantly reducing the duration of labor in both the first and second stage when

compared to a control group. The results of this study for the first stage of labor was ice-cold group: mean of 6.72 hrs., acupressure group: mean of 6.28 hrs., control group: mean of 8.49 hrs.; $p<0.003$ and for the second stage of labor was ice-cold group: mean of 28.05 min., acupressure group: mean of 30.45 min., and control group: mean of 37.02 min.; $p<0.04$ (Afefy, 2015). As for the third stage of labor, no significant difference was found with results being ice-cold group mean of 6.87 min., acupressure group mean of 6.69 min., and control group mean of 6.92 min.; $p=0.28$.

A randomized study (N=100) conducted in Iran by Bolbol-Haghighi et al. (2016) agrees with the above study that massage significantly reduces the duration of labor in both the first and second stages. Healthy singleton term pregnant women aged 18-45 with no pregnancy complication (n=50) received massage to the underbelly, upper thighs, sacral region, shoulders, and legs for 30 minutes while the control group (n=50) received routine healthcare. The results of this study were massage group 8.96 ± 5.31 hrs. and control group 11.46 hrs. ±3.71 hrs.; $p<0.0001$ in the first stage of labor and massage group 49.29± 27.86 min. and control group 64.14± 34.67 min.; $p=0.003$ in the second stage of labor (Bolbol-Haghighi et al., 2016). Utilizing a partogram to look at cervical dilation, Bolbol-Haghighi et al. (2016) also determined that there was a significant difference between those passing the alert line with 19% passing the alert line in the intervention group compared to 44% in the control group ($p<0.0001$). This suggests that cervical dilation was slower in the control group.

In contrast to the above studies, a study conducted by Erdogen and Yanikkerem (2017) determined that there was not a significant difference in duration of labor when massage is compared to traditional care; however, they only studied this is the second stage of labor. When massage was applied to the back, shoulders, and arms for 30 minutes at 3-4 cm dilated, 5-7 cm

dilated, and 8-10 cm dilated and compared to the control group the results were massage: 24.6 ±12.7 min., control: 31.7±20.9 min.; p>0.05.

Sterile water injections.

Two studies evaluated sterile water injections for their effect on duration of labor (Koyucu et al., 2018; Saxena et al., 2009). Neither study found a significant difference when compared to a control group. Koyucu et al. (2018) utilized a partograph to determine the effect of intradermal sterile water injections on duration of labor and found that although there was a shorter time between injection of sterile water to delivery when compared to a group of women receiving dry injections, this was not a significant difference (SWG: 170 ± 53.4 mins; DIG: 180 ± 62.65 min.; p=0.06). Saxena at al. (2009) showed the duration of labor being 4.01 ± 2.15 hrs. in the intracutaneous sterile water injection group and 4.17 ± 2.30 hrs. in the normal saline group.

Acupressure.

A variety of acupressure points can aid in inducing and management of labor (Dabiri & Shahi, 2014). It is thought that this non-invasive method can increase the intensity of uterine contractions without having an effect on the duration and intervals of said contractions (Dabiri & Shahi, 2014). The acupoint SP6 which is four fingers above the tip of the internal malleolus facing the tibia is thought to strongly influence the baby to move down in the pelvis to promote labor (Mafetoni & Shimo, 2015).

A randomized controlled study (N=153) conducted in Brazil by Mafetoni and Shimo (2015) provided healthy singleton pregnant women >/=4 cm dilated and contracting 2-3 times in 10 minutes (n=51) received acupressure to the SP6 point for a period of 20 minutes during contractions. These women were compared to both a touch group receiving low-intensity

pressure in the same way as the acupressure group and a control group. Mafetoni and Shimo (2015) concluded that those receiving acupressure had a significantly shorter labor when compared to both the touch group and the control group. Following are the results for total duration of labor: acupressure 628.1 min., touch 891.4 min., $p=0.0093$; acupressure 628.1 min., control 913.1 min., $p=0.0041$. No difference was found between the touch and the control group ($p=0.8802$).

Yildirim et al. (2018) also determined that acupressure can significantly shorten labor (experimental group 240.08 min., control group 308.08 min.; $p<0.001$). When ice pressure at the Hugo (LI4) region was compared to those receiving traditional care results were $p<0.001$. Yildirim et al. (2018) examined contractions frequency and intensity, cervical dilation, and cervical effacement. A partogram was used to visualize contractions frequency and intensity of the two groups. At 80 minutes there was a significant difference found in contraction frequency and intensity between the two groups ($p<0.05$). The results were as follows: frequency of contractions- experimental group 3.22 ± 1.65 and control group 3.89 ± 1.80 and intensity of contractions- experimental group 78.58 ± 9.12 and control group 70.86 ± 11.53. Cervical dilation was found to be similar in both groups ($p>0.05$) while a statistical difference in effacement in those receiving acupressure was noted at 80 minutes ($p<0.05$) (Yildirim et al., 2018).

These findings were reinforced by Hamid et al. (2016) where it was found that women receiving acupressure to SP6 ($n=50$) had a significantly shorter duration of labor in both the first and second stage when compared to a control group ($n=50$) (first stage: 6.02 ± 1.07 hrs. compared to 9.45 ± 2.71 hrs.; $p=0.002$; second stage: 23.42 ± 12.00 mins. compared to 34.89 ± 9.53 mins, $p<0.04$). Hamid et al. (2013) also found that when women received acupressure

bilaterally to SP6 they seemed to have a better and faster progress in cervical dilation as well as duration and frequency of contractions. Cervical dilation was 1.23 cm/hr. in the study group compared to 0.88 cm/hr. in the control group ($p<0.001$).

Hamlact and Yazici's (2017) study utilizing acupressure at LI4 also looked at cervical dilation. Cervical dilation was monitored before the intervention and post-intervention and compared it to the control group receiving traditional care. Cervical dilation on admission between the two groups were similar (study group: 3.38 ± 0.86, control group: 3.22 ± 1.09). However, after the first application of acupressure there was a statistically significant difference between the two groups of cervical effacement (study group: 69.54 ± 5.26, control group: 66.59 ± 6.44, $p=.021$).

In agreement with the above-mentioned studies, utilizing a labor partogram, a significant difference in the first stage of labor was found in the intensity and duration of uterine contractions with the use of acupressure applied to bladder points BL5, BL8, BL9 and gallbladder points GB8, GB16, GB17, GB18, and GV20 (Mansouri et al., 2018). Thirty minutes after each of the cycles of acupressure in the first stage of labor the results were as follows: bladder group 54.8 ± 4.9 sec., gallbladder group 59.6 ± 5.9 sec., and control group 49.8 ± 6.0 sec.; $p<0.001$. Results were also recorded thirty minutes after the last intervention cycle in the first stage of labor (bladder group 52.1 ± 1.7 sec., gallbladder group 57.9 ± 4.1 sec., and control group 43.1 ± 0.3 sec.; $p<0.001$) and in the whole active phase of the first stage of labor (bladder group 66.5 ± 5.8 sec., gallbladder group 69.5 ± 3.2 sec., and control group 59.7 ± 56.3 sec.; $p<0.001$). Although there proved to be a significant difference in the first stage of labor this was not the case during the second stage. Thirty minutes post-intervention in the second stage results were bladder group 72.7 ± 2.3 sec., gallbladder group 74.4 ± 2.3 sec., and control group 70.8 ±

7.5 sec.; p=0.09 and during the whole second stage of labor results were bladder group 80.3 ± 6.3 sec., gallbladder group 82.2 ± 7.2 sec., and control group 79.2 ± 2.3 sec.; p=0.16) (Mansouri et al., 2018).

One randomized controlled study conducted in Iran by Torkzahrani et al. (2015) examined the effectiveness of acupressure to SP6 on cervical ripening. Healthy nulliparous term low-risk pregnant women with a Bishop score of </= 4 who had not had intercourse in the last 24 hours were divided into three groups; acupressure by researcher (n=42), acupressure by the mother (n=41), and a control group (n=50). Acupressure was applied to the SP6 spot lasting 10 seconds – 2 minutes for 1-5 sessions between the hours of 9am-11am for a total of 20 minutes. Bishop scores were monitored at 48 hours after the start of the study, 96 hours after the start of the study, and at hospitalization. There was only a significant difference in Bishop score at the time of hospitalization (5.95 ± 2.02, 6.02 ± 1.68, 5.02 ± 2.03 ($p<0.02$) and acupressure performed by the woman herself seemed to work better (p=0.014). Results at 48 hours and 96 hours were as follows: 48 hours = 4.88 ± 1.83, 5.12 ± 1.92, 4.06 ± 1.59 ($p<0.012$) and 96 hours = 5.08 ± 1.77, 5.21 ± 1.75, 5.04 ± 1.96 (p=0.95). Although there was not a significant difference at 96 hours, there was still an increase in Bishop scores in the acupressure groups compared to the control groups.

In contrast to the above articles, Dabiri and Shahi's (2014) study previously mentioned regarding the reduction of pain found no significant difference in the duration of the first stage of labor (p=0.942) when the group receiving acupressure to the Hugo point (LI4) (n=50) was compared to the touch group (n=50) and the control group (n=49).

Another randomized controlled trial not resulting in a significant difference in labor duration was done in Iran by Torkzahrani et al. (2017) examining the effectiveness of

acupressure to points bladder 32, spleen 6, and bladder 60 every other day for 5 times in each location for 60 seconds at initiating labor. When the acupressure group (n=50) was compared to a sham group (n=50) where women received pressure to three ineffective points and a control group (n=50) the results of spontaneous initiation of labor were as followed: 48hrs.-15 (30%) in acupressure group, 10 (20%) in sham acupressure group, and 11 (22%) in routine care group, p=0.464; 49-96 hrs.- 7 (14%) in the acupressure group, 17 (34%) in the sham acupressure group, and 12 (24%) in the routine care group, p=0.111 and at the time of hospitalization- 28 (56%) in the acupressure group, 28 (56%) in the sham acupressure group, and 30 (60%) in the routine care group, p=0.897. Torkzahrani et al. (2017) also found no difference in the mean interval from procedure to birth (Acupressure group 124.88 ± 75.93 min., sham acupressure group 135.39 ± 70.09 min., and routine care group 114.16 ± 52.64 min.; p=0.565).

In summary, the aforementioned articles looking at acupressure examined duration of labor, frequency and intensity of contractions, cervical effacement, cervical dilation, and bishop score. Mafetoni and Shimo (2015) and Hamid et al. (2016) both studied acupressure to point SP6 and both studies showed a statistically significant decrease in duration of first and second stage of labor. Yildirim et al. (2018) also showed a statistically significant decrease in duration of labor; however, this study looked at acupressure point LI4. The two studies not showing a significant decrease in duration of labor was conducted by Dabiri and Shahi (2014) and Torkzahrani et al. (2017) who looked at acupressure points LI4, BL32, SP6 BL60. Three studies found statistically significant increases in frequency and intensity of uterine contractions when compared to a control group (Hamid et al., 2016; Mansouri et al., 2018; Yildirim et al., 2018). Studies done by Hamlact and Yazici (2017) and Yildirim et al. (2018) both found a significant increase in cervical effacement while the study conducted by Hamid et al. (2016) found a

significant increase in cervical dilation after intervention. Only one study looked at bishop score and found no significant difference at 48 and 96 hours post intervention; however, at hospitalization there was a statistically significant difference (Torkzahrani et al., 2015).

Acupuncture.

Very little research has been done looking at the how acupuncture affects the duration of labor; however, acupuncture is one of the most accepted complementary therapies and its use is increasing in obstetric care (Gribel et al., 2011).

One of the two studies that demonstrated a decrease in duration of labor as a result of acupuncture was conducted by Asadi et al. (2015). This study placed healthy term pregnant women in the active phase of labor with no pregnancy complications into either the acupuncture group (n=32) that received acupuncture to LI4 and SP6 for 20 minutes or the sham acupuncture group (n=31) that received superficial contact with the needles and had them shaken instead of rotated. When compared in both the first and second stage of labor, the duration of labor was significantly decreased in the acupuncture group (first stage-acupuncture: 162 min., control: 280 min.; $p<0.001$; second stage-acupuncture: 130 min., control: 250 min.; $p<0.001$) (Asadi et al., 2015).

The second study, a randomized controlled study (N= 180) conducted in China by Dong et al. (2015) found that acupuncture to EX-B2 and SP6 can significantly reduce the length of the first stage of labor when compared to a control group receiving traditional healthcare. Results are as followed: EX-B2 group: 151.47 ± 55.52 min., SP6 group: 163.35 ± 61.96 min., control group: 184.92 ± 46.52 min.; $p<0.05$. When the EX-B2 group was compared to the SP6 group, duration of labor was found to be slightly shorter in the EX-B2 group but was not significantly different ($p>0.05$). There was not a significant difference when it came to duration of the second

stage of labor (EX-B2: 45.78 ± 15.76 min., SP6: 48.80 ± 21.35 min., control: 49.31 ± 18.86 min.; p=0.54) or the third stage of labor (EX-B2: 9.93 ± 4.13 min., SP6: 10.21 ± 3.91 min., control: 11.08 ± 3.89 min.; p=0.87) (Dong et al., 2015). Dong et al. (2015) also determined there was no difference in the use of oxytocin among the three groups (EX-B2: 33 (55%), SP6: 32 (53.3%), control 39 (65%); p=0.38).

Gribel et al. (2011) conducted a randomized controlled trial (N=72) in Brazil comparing electroacupuncture (n=35) administered for 30 minutes every 7 hours in a 24-hour time period to the administration of 25 mg of Misoprostol intravaginally (n=32) every 6 hours for 24 hours. There was a significant difference in duration of labor; however, it was in favor of the Misoprostol group. The results were acupuncture 404 ± 201 min. and misoprostol 279 ± 161 min.; p=0.0362. Gribel et al., (2011) also examined Bishop scores finding no difference in final Bishop score or Bishop score progression. Final Bishop scores were 7.7 ± 2.2 in the acupuncture group and 6.4 ± 2.7 in the misoprostol group; p=0.201 and Bishop score progression was 4.6 ± 2.4 in the acupuncture group and 3.4 ± 2.8 in the misoprostol group; p=0.095. This study also determined that labor was induced in 74% of the acupuncture group and 53% in the misoprostol group which was also not a significant difference (p=0.282). Women used Oxytocin in both groups with 37% using it in the acupuncture group and 22% using it in the misoprostol group (p=0.172). Although labor was found to be longer in the electroacupuncture group, it was still able to produce a vaginal delivery without the use of other agents meaning that this could be used if the patient is strongly opposed to the use of a pharmacological agent.

Modlock et al. (2010) also found there not to be a significant difference in duration of labor when comparing healthy term pregnant women in the acupuncture group (n=62) receiving acupuncture to BL67, LI4, SP6, and GV20 for 30 minutes while being stimulated with manual

twirling every 10 minutes to a sham acupuncture group (n=63) receiving care in the same way but with blunt point needles that retracted back into the needle handle. The results of this study taking place in Denmark were acupuncture 448 min. and control 403 min. (p=0.38). Along with assessing the duration of labor, Modlock et al. (2010) also looked at the effect acupuncture had on induction of labor in the post-term women. Fewer women went into active labor within the first 24 hours after the true acupuncture (12%) than in the control group (14%) (p=0.79) determining that acupuncture for induction of post-term women was not effective.

Smith et al. (2008) divided term healthy pregnant women (N=364) from Australia not in active labor but scheduled for a post-term induction into two groups; the acupuncture group (n=181) who received acupuncture to points LI4, SP6, UB31, UB32, ST36, and Taichong Liv 3 for 30-40 minutes or the sham acupuncture group (n=183) who received acupuncture at non acupuncture points in the sacral area, hand, foot, below the knee, and the lower leg for the same amount of time as the acupuncture group. Each group received two sessions in the two-day period before their planned medical induction. The results were not significant when utilizing acupuncture compared to the sham group; however, the duration was shorter in the acupuncture group (5.9 hrs.) than the control group duration of 6.5 hours (p=0.5) (Smith et al., 2008). There was also not a significant difference between the groups in regard to time from intervention to delivery with acupuncture being 68.6 hours and 65 hours in the control group with a p-value of 0.23. Smith et al. (2008) also found no significant difference between acupuncture and sham acupuncture in the use of induction methods. Prostaglandin induction (acupuncture: 85 (47%), sham: 69 (37.7%); p=.11), AROM only (acupuncture: 69 (38.1%), sham: 76 (41.5%); p=.57), oxytocin only (acupuncture: 36 (19.9%), sham: 41 (22.4%); p=.55), AROM plus oxytocin

(acupuncture: 29 (22.3%), sham: 35 (27.8%); p=.52), prostaglandin plus AROM and oxytocin (acupuncture: 10 (7.7%), sham: 11 (8.9%); p=.68).

Type of delivery.

Unfortunately, cesarean rates in 69 countries are currently above 15% making it necessary to find ways to reduce this trend (Koyucu et al., 2018). Eight of the appraised studies reviewed the effect of touch therapies on the mode of delivery (Bolbol-Hafhighi et al., 2016; Dabiri &Shahi, 2014; Gribel et al., 2011; Koyucu et al., 2018; Mafetoni & Shimo, 2015; Modluck et al. 2010; Torkzahrani et al., 2017; Yildirim et al., 2018). The eight studies included one study examining massage, one study examining sterile water injections, four studies examining acupressure, and two studies examining acupuncture. Types of delivery can consist of vaginal delivery, cesarean delivery, vacuum-assisted delivery, and forceps-assisted delivery. Although there was no significant difference in mode of delivery in seven out of the eight articles, all studies did find that touch therapies produced a lower number of cesarean deliveries when compared to a control group.

Massage.

Bolbol-Haghighi et al. (2016) when studying the effectiveness of massage compared to those individuals receiving traditional healthcare (N=100) found that the cesarean rate caused by abnormal events during labor was lower in those receiving massage therapy; however, the difference was not significant. All except one of the women (98%) in the massage group delivered vaginally (2% delivering by cesarean) compared to the forty-seven out of the fifty women (94%) in the control group who delivered vaginally with two (6%) delivering by cesarean (p=0.17) (Bolbol-Haghighi et al., 2016). A larger sample may be needed to show significance.

Sterile water injections.

In the study previously mentioned looking at intradermal sterile water injections conducted by Koyucu et al. (2018) concluded there to be a two-fold higher cesarean rate in the control group receiving dry injections when compared to the intervention group; however, it did not reach statistical significance. It was found that the rate of cesarean sections was 10.7% in the sterile water injection group and 20.2% in the dry injection group (p=0.08). Both of these groups in Turkey showed a lower cesarean rate than the United States.

Acupressure.

Dabiri and Shahi's (2014) study that took place in Iran, looking at the effect of acupressure to Hugo point (LI4) on labor pain and duration of labor examined mode of delivery as a secondary outcome. When comparing the acupressure LI4 group to a group receiving touch to LI4 and a group receiving traditional healthcare no significant difference in mode of delivery was found (p=0.840). Reinforcing these findings, Mafetoni and Shimo's (2015) study also resulted in similar types of delivery between the group receiving acupressure to SP6G, the touch group, and the control group. Although not statistically different, there were more cesarean deliveries in the control group than in the acupressure group. The results of cesarean rates are as followed: acupressure 14 (26.9%), touch 19 (36.6%), and control 22 (42.3%); (p=0.2526) (Mafetoni & Shimo, 2015). This study took place in Brazil where it is common to perform cesarean sections which could be the reason for the high rate; however, the increase is becoming an issue for public health (Mafetoni & Shimo, 2015). Studying the effect of acupressure to bladder 32, spleen 6, and bladder 60 on the initiation of labor, the randomized controlled trial conducted by Torkzahrani et al. (2017) found that acupressure had no effect on the type of delivery. Normal vaginal birth occurred in 28 (56%) women in acupressure group, 24 (48%)

women in sham acupressure group and 26 (52%) women in the routine care group (p=0.726) whereas cesarean birth occurred in 22 (44%) women in the acupressure group, 26 (52%) women in the sham acupressure group, and 24 (48%) women in the routine care group (p=0.726) (Torkzahrani et al., 2017). The high rate of cesarean sections in this study could be due to needing to induce labor before the start of spontaneous labor. Although no studies have found a significant difference in the type of delivery, one study did find a significant difference in episiotomy rates which were lower when receiving ice acupressure to LI4 when compared to a control group (Yildirim et al., 2018). The results were the experimental group 30.6% and 58.3% in the control group with a p-value of 0.032.

Acupuncture.

As a secondary outcome of the Modluck et al. (2010) study comparing acupuncture to points BL67, LI4, SP6, and GV20 to a sham acupuncture group it was determined that acupuncture had no effect on instrumental delivery. Those with no need of instrumental assistance accounted for 68% in the acupuncture group and 67% in the sham acupuncture group (p=0.78). In contrast to all of the above-mentioned articles, Gribel et al. (2011) study resulted in a significant difference when it came to the type of delivery. Comparing electroacupuncture to Misoprostol resulted in twenty-two vaginal deliveries, two forceps deliveries, and eleven cesarean deliveries in the acupuncture group and ten vaginal deliveries, one forceps delivery, and twenty-one cesarean deliveries in the Misoprostol group (p=0.106) (Gribel et al., 2011).

Maternal satisfaction and behaviors during labor.

Lack of satisfaction with her labor and birth experience can have an effect on a woman's emotional status as well as impact her willingness to have another baby. It is thought that touch therapies have an effect on maternal satisfaction due to the fact that physical touch provides a

sense calmness and safety, decreases stress and allows the woman to feel in control of her body (Erdogan & Yanikkerem, 2017). Three studies examined maternal satisfaction and behaviors during labor as a secondary outcome of their research (Erdogen & Yanikkerem, 2017; Hamlact & Yazici, 2017; Koyucu et al., 2018).

Massage.

Massage is helpful in causing a distraction for the woman and helping her feel in control of the delivery (Erdogen & Yanikkerem, 2017). The study conducted by Erdogen and Yanikkerem (2017) determined that massage increased the satisfaction scores of laboring women by utilizing an interview questionnaire. Satisfaction scores were 8.8 ± 0.7 in the massage group and 6.9 ± 0.8 in the control group making the difference statistically significant ($p<0.05$). 96.8% of the women receiving massage in this study stated that massage helped them feel safe throughout their labor. Although satisfaction scores were increased, there was not a significant difference when it came to the behaviors of women during labor. Behaviors studied were fist clenching, crying, grimacing, screaming, and anxiety.

Sterile water injections.

Koyucu et al. (2018) concluded that women who received sterile water injections were more satisfied, would recommend them for use by others, and would desire to use them in future pregnancies when compared to the group receiving dry injections. Rates of satisfaction were found to be significantly higher in those receiving the sterile water injections when reviewing the satisfaction questionnaire. The results are as followed: SWG: 71 (84.5%); DIG: 30 (35.7%); $p=0.01$ (Koyucu et al., 2018).

Acupressure.

In contrast to Erdogen andYanikkerem's (2017) study, Hamlact and Yazici's (2017) study using acupressure to LI4 showed a significant difference in the behavior of the women during labor when compared to the women not receiving the intervention ($p<0.05$). Women in the control group experienced more discomfort, changes in facial expressions, squeezing hands, groaning, nausea and vomiting, crying, and screaming whereas the acupressure group experienced silent crying and staying restful.

Neonatal outcomes.

Pregnant women understand that they not only have to care for themselves but also their unborn baby. Labor pain has been known to cause a cascade of events that can cause abnormal fetal heart rates as well as low APGAR scores (Dabiri & Shahi, 2014). With narcotics and epidurals being the commonly used treatment, much research has been done on the potential side effects. The administration of narcotics can cause neonatal respiratory depression which is one of the reasons women are seeking other options. Ten out of the twenty articles in this literature review studied the effect of the non-pharmacological touch intervention on neonatal outcome as a secondary outcome (Bolbol-Haghighi's et al., 2016; Dabiri & Shahi, 2014; Dong et al., 2015; Erdogen &Yanikkerem, 2017; Koyucu et al., 2018; Mafetoni & Shimo, 2015; Ozgoli et al., 2019; Saxena et al., 2009; Torkzahrani et al., 2017; Yildirim et al., 2018). At least one or more of the studies examined APGAR scores at 1 minute and 5 minutes, breastfeeding, fetal heart rate, and birth weights. Only two articles produced significant results. Although the rest of the studies did not find significant results, there were no negative results resulting from the use of touch interventions.

Massage.

During Bolbol-Haghighi's et al. (2016) randomized controlled study it was determined that massage to the underbelly, upper thighs, sacral region, shoulders, and legs for 30 minutes when compared to those women receiving traditional healthcare had significantly better 1 and 5 minute APGAR scores (1-minute APGAR: massage group 8.55 ± 0.74 and control group 7.82 ± 0.93, $p<0.0001$ and 5-minute APGAR: massage group 9.36 ± 0.71 and control group 8.92 ± 0.90, $p<0.0001$). Bolbol-Haghighi et al. (2016) believe the higher APGAR scores are attributed to the decrease in the duration of first and second stage of labor in the massage therapy group. Long labors have been known to carry risks. In contrast, Erdogen & Yanikkerem's (2017) randomized controlled study comparing massage to a control group, found no significant difference between the two groups when it came to 1-minute APGAR scores (massage group 7.9 ± 0.2 and control group 7.8 ± 0.3, $p>0.05$).

Sterile water injections.

Koyucu's et al. (2018) randomized controlled study examined the effects intradermal sterile water injections had on 1-minute APGAR scores, 5-minute APGAR scores, and breastfeeding success at one hour postpartum and day one of life. The Infant Breastfeeding Assessment Tool (IBFAT) was used to evaluate the success of breastfeeding. Results showed similar APGAR scores at both 1 minute and 5 minutes (1 min: SWG: 8.48 ± 0.5; DIG: 8.6 ± 0.49; $p=0.122$, 5min: SWG: 9.77 ± 0.42; DIG: 9.76 ± 0.42; $p=0.855$). Breastfeeding scores at one hour postpartum and at one day of life were also similar between the two groups (1hr. SWG: 9.69 ± 1.54; DIG: 9.34 ± 1.48; $p=0.181$; 1day SWG: 10.32 ± 1.49; DIG: 10 ± 1.27; $p=0.145$) (Koyucu et al., 2018). Reinforcing these findings, Saxena's et al. (2009) study on sterile water injections also showed there to be no difference in APGAR scores when comparing

intracutaneous sterile water injections to a group receiving normal saline. Mean APGAR scores were 8.7 ± 0.5 in the sterile water group and 8.58 ± 0.15 in the normal saline group.

Acupressure.

Agreeing with most of the above-mentioned studies, Dabiri and Shahi's (2014) study utilizing acupressure to LI4 also found no significant difference in APGAR scores when compared to a touch group and a control group (p=0.621). In another study focusing on acupressure, Mafetoni and Shimo (2015) found APGAR scores to be the following: 1 minute-acupressure group 8.5, touch group 8.17, control group 8.3; p=0.9542 and 5 minutes-acupressure group 9.6, touch group 9.54, control group 9.3; p=0.7218. These results were insignificant. Yildirim et al. (2018) agreed that acupressure did not have an impact on APGAR scores (p>0.05); however, the study did determine that fetal heart rates 80 minutes post ice acupressure to LI4 showed a significant difference when compared to the control group. When fetal heart rates were measured at 40 minutes there was not a significant difference found. The results at 40 minutes were control group 146.11 ± 10.90 compared to the experimental group 146.17 ± 12.55 with a p-value of 0.984 and at 80 minutes were control group 146.67 ± 11.72 compared to the experimental group 139.50 ± 10.44 (p=0.008) (Yildirim et al., 2018). Although there was a difference in baseline fetal heartrate at 80 minutes, both baselines are within normal limits. No difference in APGAR scores was found in either the Torkzahrani et al. (2017) study or the study conducted by Ozgoli et al. (2016). Results of the Torkzahrani et al. (2017) study were 1 min: 8.30 ± 0.46 in the acupressure group, 8.34 ± 0.48 in the sham acupressure group, and 8.40 ± 0.49 in the routine care group (p=0.574) and at 5 min: 9.10 ± 0.30 in the acupressure group, 9.08 ± 0.27 in the sham acupressure group, and 9.06 ± 0.24 in the routine care group (p=0.736). As for Ozgoli et al. (2019) study, the following results were produced: 1 min: 9 (7-9)

in the LI4 group, 9 (7-9) in the BL32 group, and 9 (8-9) in the control group (p=0.57), 5 min: 10 (8-10) in the LI4 group, 10 (9-10) in the BL32 group, and 10 (10) in the control group (p=0.35).

Acupuncture.

Only one study looking at the effects of acupuncture included neonatal outcomes in their research. The secondary outcomes of Dong et al. (2015) included birth weight and APGAR scores. The outcomes of electroacupuncture to EX-B2 (n=63) and SP6 (n=61) compared to those receiving traditional healthcare (n=64) did not show a significant effect on birth weights or 1- and 5-minute APGAR scores. Results for birth weight were EX-B2: 3,381.33 ± 309.17, SP6: 3,445 ± 269.60, control: 3,422.50 ± 288.84; p=0.48 while the results for APGAR scores were 1 min EX-B2: 9.90 ± 0.30, SP6: 9.93 ± 0.31, control: 9.88 ± 0.37, 5 min EX-B2: 9.99 ± 0.13, SP6: 10.00 ± 0.00, control: 9.97 ± 0.13; p>0.05 (Dong et al., 2015).

Strengths and Weaknesses of the Research Studies

Throughout the appraisal of nineteen randomized controlled trials and one quasi-experimental study, many themes for research strengths and weaknesses were identified. One of the biggest strengths found in many of the appraised articles is that they studied multiple outcomes related to labor such as labor pain, duration of labor, mode of delivery, maternal satisfaction, and APGAR scores. Another common strength was that all of the studies were randomized controlled trials comparing the intervention to a control and all studies were good to high quality. Many of the studies came with their own unique strengths as well. The studies looking at sterile water injections excluded women who needed to use other forms of analgesia during their labor. Doing this allowed for more reliable findings. All studies comparing acupuncture to a sham acupuncture group as well as the three studies looking at sterile water

injections were blinded helping with reliability as well. Several of the studies identified consistent results making the findings reliable.

None of the reviewed studies reflected American practice resulting in a weakness for this specific literature review. Although practices are common, no studies have been done in the United States regarding the specific studied non-pharmacological interventions. Many of the studies noted that a weakness of their study was the sample size. Larger sample sizes may be beneficial to make the differences found significant. When using massage, acupuncture, and acupressure the interventions were limited to a small amount of time and were limited to only a few locations on the body. Women have different pain thresholds which could have an effect on reliability when determining a decrease in labor pain. As for the studies examining massage and acupressure, it was difficult to conduct a blinding protocol.

Summary

Twenty research articles were critically reviewed with the purpose of determining the effectiveness of non-pharmacological touch therapies on labor. The four touch therapies examined were massage, acupressure, acupuncture, and sterile water injections. All of the articles were level I strength and classified as either high or good quality according to the John Hopkins Research Appraisal Tool (Dearholt & Dang, 2012). Significant reductions in pain during labor was found in twelve articles with one showing a greater decrease in pain when compared to a control group but not to a statistically significant level. Ten out of eighteen studies revealed significant results when it came to duration or labor and the labor process. Although the eight other articles did not reach a level of statistical significance it was evident that touch interventions did not prolong labor. Only one study showed a significant difference when cesarean and vaginal births were compared. However, seven other articles did find that

touch therapies produced a lower number of cesarean deliveries when compared to a control group without touch therapy. Maternal satisfaction was found to be much higher when utilizing the non-pharmacological interventions with all three articles showing statistically significant results. Lastly, two out of ten studies showed significant results on neonatal outcomes with the other eight showing similar trends but not reach statistical significance.

Chapter four will address implications for nurse-midwifery practice, examine recommendations for future research studies, as well as integrate the Modeling and Role Modeling Theory regarding the effectiveness of non-pharmacological touch therapies during labor.

Chapter IV: Discussion, Implications and Conclusions

The purpose of this review was to determine the effectiveness of non-pharmacological touch interventions in labor. Critical analysis utilizing the Johns Hopkins Research Evidence Appraisal Tool was conducted on the 20 pertinent scholarly articles chosen for the review. Each of those articles made recommendations for future research and discussed implications for practice. Chapter four will discuss implications for future nurse-midwifery practice, opportunities for future research, and integrate the Modeling and Role Modeling theory based on the findings of the appraised articles.

Literature Synthesis

The research question, "what is the effectiveness of non-pharmacological touch interventions in labor?" was used as the foundation for this critical review. Touch interventions chosen for analysis included acupressure, acupuncture, massage, and sterile water injections. Twenty scholarly articles examined the effectiveness of the above-mentioned touch interventions for labor pain, the labor process, duration of labor, mode of delivery, maternal satisfaction, and neonatal outcomes.

Out of the thirteen articles that examined the effect on labor pain, twelve showed a significant decrease in pain when compared to a control group. Half of the studies looking at reduction of pain as an outcome used acupressure as the intervention. It was found that pain was decreased anywhere from 30-120 minutes with one application. It can be concluded that point LI4 is an effective acupressure point as four out of the six studies examined this particular point and all showed a statistically significant reduction in labor pain. One study showed that acupressure to SP6 not only reduces pain significantly but also significantly reduces the need for administering analgesia. This can be an effective intervention for women who do not desire

narcotics or epidurals to help with their labor pain. Massage to point LI4 as well as to the back, shoulders, and arms also showed a significant decrease in pain. As for sterile water injections, it was concluded that they are effective at reducing back pain related to labor without the use of other analgesia methods lasting 45-90 minutes. Sterile water injections can be used multiple times throughout labor making for an effective intervention for pain while keeping the women mobile. Only two studies used acupuncture and mixed results were obtained. One of the studies had a much smaller sample size and did not provided significant results; however, there was still a greater reduction of pain in the women receiving acupuncture when compared to the sham acupuncture group. Acupuncture to points EX-B2, SP6, and LI4 can be effective in reducing labor pain.

Eighteen of the research studies looked at the duration of labor and labor process when any of these touch interventions were utilized with ten showing a significant result. Three studies using massage showed mixed results. Ice massage to point LI4 and massage to the under belly, upper thighs, sacral region, shoulders, and legs are effective at reducing the duration of the first and second stage of labor significantly. After reviewing the studies examining sterile water injections it was determined that the use of this intervention is not effective in reducing the duration of labor. As for acupressure, SP6 is effective at reducing the duration of labor, increasing duration and frequency of uterine contractions, and increasing cervical dilation. Acupressure to points bladder, gallbladder, GV20, and LI4 are also effective at increasing frequency and duration of uterine contractions. Cervical effacement can be significantly increased with the use of acupressure to point LI4. Acupressure was not determined to be effective at cervical ripening for induction of labor; however, only one study examined this. Those studies examining acupuncture also found there to be mixed results. When acupuncture is

applied to points SP6 and LI4 it can be effective at reducing the duration of first and second stage of labor. One study looked at electroacupuncture compared to a group receiving Misoprostol for augmentation with significant findings in favor of Misoprostol; however, electroacupuncture was shown to be just as successful at producing a vaginal delivery without the use of other pharmacological methods.

Massage, acupuncture, acupressure, and sterile water injections were not effective at significantly reducing the need for cesarean sections. Although not statistically significant, these touch therapies were shown to produce fewer cesarean sections when compared to the control group. It was shown that when comparing electroacupuncture to the administration of Misoprostol that cesarean rates are significantly lower in those receiving electroacupuncture. Acupressure to point LI4 can be effective at significantly reducing episiotomy rates; however, only one study examined this outcome. It was evident that non-pharmacological interventions did not increase the risk for cesarean sections, forceps delivery, or episiotomy rates.

Out of the twenty articles appraised three looked at maternal satisfaction. All three showed a significant increase in satisfaction when using touch interventions compared to those that did not. Massage and sterile water injections can be effective at increasing maternal satisfaction while acupressure significantly improves the behaviors of the women in labor. Women using these non-pharmacological interventions have been satisfied enough to want to use them in future pregnancies and would recommend the use of them to other women.

Finally, six articles reviewed neonatal outcomes with only one showing a significant increase in APGAR scores and the rest showing no difference. It is thought that the increase in APGAR scores with the use of massage was due to the significant decrease in duration of labor.

Although the other studies did not show a significant difference in neonatal outcomes, touch therapies did not have a negative effect.

The literature surrounding these touch therapies have shown many positive, with no known negative impacts. Utilizing non-pharmacological interventions allows a natural non-invasive approach at decreasing labor pain, decreasing duration of labor, and increasing the satisfaction of the laboring woman.

Current Trends and Gaps in the Literature

It has become common over the past decade or so to utilize pharmacological methods to induce labor which also increases the need for other interventions during labor. However currently, there are an increasing number of women looking into having a natural birth, preferring non-invasive interventions (Torkzahrani et al., 2017). Although this is the case, pharmacological interventions are generally the first choice for providers because they know these methods work. However, these interventions can bring about unwanted side effects for both the mother and her baby. Nursing curriculums do not provide a curriculum for non-pharmacological methods and providers are not taking the time for continuing education that teaches these skills so that they can provide women with holistic care (Erdogan & Yanikkerem, 2017).

A common trend within most of the reviewed literature is mentioning that labor is one of the most painful things a woman will do in her life. Utilizing non-pharmacological methods not only touches on the physical aspect of pain but also enhances the psycho-emotional and spiritual aspects of care (Afefy, 2015). Although there are many options for pain relief methods during labor, they are not always available especially to those women in developing countries where

resources are limited. This is one example where low-cost, non-pharmacological interventions are especially beneficial.

Although advantages of non-pharmacological interventions have been found, further research is still needed to show their full potential especially research in the United States. Bringing studies to the United States can help to show the benefits of utilizing non-pharmacological interventions thus showing the need to increase clinical education and application of these complementary and alternative therapies.

Implications for Nurse-Midwifery

Nurse-midwives have the responsibility of providing women with not only a safe labor for herself and her baby but also for providing them with a positive labor experience. Non-pharmacological touch interventions such as acupressure, acupuncture, massage, and sterile water injections have been shown in many research studies to do just that. The literature addressing acupressure, acupuncture, massage, and sterile water injections for use during labor has shown many positives, with no known negative impacts. Utilizing these non-pharmacological interventions allows a natural non-invasive approach at decreasing labor pain, decreasing the duration of labor, and augmentation as well as increasing the satisfaction of the laboring woman.

The findings in the appraised literature encourage providers to attend courses to learn and develop the skills to be able to use non-pharmacological interventions when caring for the laboring woman (Erdogan & Yanikkerem, 2017). Many women are looking to achieve a natural birth using natural and non-invasive techniques. With proper training and education, nurse-midwives can meet their client's desires. Prolonged training in not required for acupressure, massage, and sterile water injections allowing all nurses and providers to be able to perform

these non-pharmacological interventions (Mafetoni & Shimo, 2015). Being able to provide these women with alternative options to pharmacological management follows many of the Hallmarks of Midwifery such as shared decision-making, incorporating complementary and alternative therapies, and guiding and educating them on their options (ACNM, 2012).

Pharmacological interventions such as epidurals, Misoprostol, and Pitocin are costly, may not even be available especially in underdeveloped countries, and come with risks to both mother and baby. A known risk of using pharmacologic methods for induction can lead to uterine hyperstimulation which can cause maternal and fetal stress and then could ultimately end with a cesarean section (Torkzahrani et al., 2015). It is important to understand the benefits of non-pharmacological interventions as well as educate woman on all of their options. Massage, acupuncture, acupressure, and sterile water injections are good alternatives to pharmacological therapy when either it is not available or the woman does not want to use it and can be used in birth centers, at home, and in the hospital (Afefy, 2015). These interventions can also be used in combination with pharmacological interventions when the pharmacological methods are not sufficient. Non-pharmacological interventions are low cost, easily accessible, and free of side effects for both the mother and the baby with studies even showing an improvement on APGAR scores (Bolbol-Haghighi et al., 2016). Not only can massage and acupressure be used by providers, but they can also be taught to the pregnant woman so that she can practice them at home which in turn can help prevent problems of referring to a hospital and the related costs (Torkzahrani et al., 2015).

Midwives view birth as a normal physiologic process and they advocate for non-intervention when there are no complications; however, this can be hard to do when an epidural is in place requiring more fetal monitoring as well as preventing the woman from getting out of

bed and changing position on her own. Understanding how to use sterile water injections and educating their clients on their options can aid in the overuse of intervention. Sterile water injections can easily be done by a midwife, are free from side effects other than a few seconds of pain during the injections and allow women to have the pain relief they desire while allowing them to remain mobile (Rai et al., 2013). This in turn will decrease the need for continuous fetal monitoring and allow for position change needed to get the baby in an optimal position for delivery.

Recommendations for Future Research

During the appraisal process of the 20 research articles, several recommendations were made for future research. Almost all of the clinical trials recommended recreating the studies utilizing a larger sample size to further add to the existing literature on the effectiveness of acupressure, acupuncture, massage, and sterile water injections during labor.

Acupressure and acupuncture have been found to help relieve labor pain, induce labor, and shorten the duration of labor; however, the precise mechanisms are unclear. To get a better understanding, future research is needed in order to illuminate the underlying functions that acupressure and acupuncture have on the body (Mafetoni & Shimo, 2015).

Research conducted on the effectiveness of massage, acupressure, and acupuncture chose to focus on a limited amount of points on the body such as the study done by Afefy (2015) in which the Hugo point was the only point used. Hamlact et al. (2017), as well as Dabiri and Shahi (2014), also chose to conduct their studies utilizing only the Hugo point. Further research looking at multiple points on the body instead of just one point and comparing unilateral to a bilateral application should be conducted to determine other areas of benefit acupressure and acupuncture can have on the labor process. Along with studying multiple points on the body,

studying the effectiveness of providing the intervention for longer time periods in future studies could be beneficial. Many of the current studies provide the intervention for time periods of 20-30 minutes.

Sterile water injections have been found to be an effective option for those laboring women suffering from low back pain during the first stage of labor. According to Saxena et al. (2009), further research is needed to determine if the patient can benefit from sterile water injections during the second stage of labor. Few studies examined how sterile water injections affected mode of delivery, duration of labor, and cesarean rates and although results were less than the control groups there was not a statistically significant difference, so further research would be beneficial.

Integration of Theoretical Framework

In 1982, the Modeling and Role Modeling Theory was created by Erickson, Tomlin, and Swain. This theory was developed using concepts from Piaget's Theory of Cognitive Development, Maslow's Theory of Hierarchy of Needs, Erikson's Theory of Psychological Stages, and Selye and Lazarus's General Adaptation Syndrome (Petiprin, 2016). The nurse goes through two stages; the modeling stage where they learn to view the world from the perspective of the patient and the role modeling stage where the nurse accepts and cares for the patient regardless of the patient's perspective (Petiprin, 2016). By following this theory of care, the nurse is able to build trust with the patient, promote patient control, set mutual, health-directed goals with the patient, emphasizing the patient's strengths, and promote a sense of self (Petiprin, 2016).

Utilizing complementary therapies is a holistic approach that incorporates the mind, body, and spirit. As providers, we must be able to recognize and appreciate the patient's right to

self-determination and autonomy during the laboring process. Being able to provide more than one option for pain relief and augmentation gives women a sense of control and allows for shared decision-making. Being knowledgeable about non-pharmacological interventions allows the midwife to be a facilitator by providing the woman with education and resources to help aid in her labor and a nurturer by being able to comfort the woman. Proper education on non-pharmacological interventions as well as the utilization of those interventions can aid in the ability of the woman to deal with the new stressors brought about by labor. Understanding the patient's wants and desires as well as being able to accept them and provide them with unique interventions will increase satisfaction and help them to achieve their health-directed goals.

Conclusion

The findings of this critical review of the literature endorse the benefits of utilizing non-pharmacological touch interventions during labor. For this review, twenty scholarly articles were analyzed using the Johns Hopkins Research Evidence Appraisal Tool with statistically significant results found for the efficacy of massage, acupuncture, acupressure, and sterile water injections during labor. Touch therapies are valid non-pharmacological options for women who are unwilling or unable to use pharmacological interventions. Massage, acupressure, and acupuncture are all effective at reducing labor pain and decreasing duration of labor, sterile water injections are effective at reducing back pain, and massage, acupressure, and sterile water injections are all effective at increasing maternal satisfaction. Alternative therapies can provide women with non-invasive options free of side effects for both her and her child. Non-pharmacological interventions allow nurse-midwives to view birth as a normal physiologic process and aid in advocating for non-intervention when there are no complications. Application

of the Modeling and Role Modeling Theory will aid in the midwives understanding of their patient's perspective and guide them to be a facilitator as well as a nurturer.

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Appendix 1 – Literature Review Matrix

Source: Erdogan, S. U., & Yanikkerem, E. (2017). Effects of low back massage on perceived birth pain and satisfaction. *Complementary Therapies in Clinical Practice, 28*, 169-175. doi: 10.1016/j.ctcp.2017.05.016			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine the effect that low back massage has on birth pain and birth process. *Secondary Aim:* Reviewed APGAR scores at 1 and 5 minutes, behaviors of women during labor, duration of 2nd stage of labor, and satisfaction of women regarding vaginal delivery. **Sample/Setting:** 62 pregnant term women with a single fetus, no pregnancy complications, fetus is head down, ≥4 cm dilated, no fetal distress, expected to have a spontaneous delivery, and no issues with the placenta. (n=31) in experimental group and (n=31) in the control	Study design: Randomized controlled trial. Methods: The experimental group received 30 minutes of massage at three different times (3-4 cm dilated, 5-7 cm dilated, and 8-10 cm dilated). Steps to massage included: the nurse placing both hands on the sides of the spine in the sacral region, having the woman breathe out loud during contraction, moving hands up to waist level during inspiration, moving the fingers on both hands inwards and both elbows outwards to massage across the back and towards the hips during expiration, repeat throughout the contraction, and at the end of the contraction continue to the upper back, shoulders, and down the arms. VAS scores were collected after each 30-minute massage.	VAS (3-4cm): Massage: 5.2±0.9 Control: 7.3±1.3 P=0.000 VAS (5-7cm): Massage: 6.6±1.6 Control: 8.8±1.0 P=0.000 VAS (8-10cm): Massage: 6.7±2.7 Control: 9.2±2.4 P=0.000 VAS scores in all three phases were found to be statistically significant differences. Mean of duration of second phase of labor: Massage: 24.6±12.7 Control: 31.7±20.9 ($p>0.05$), this was not a statistically significant difference. There was no significant difference when it came to the behaviors of women during labor. There was no significant difference between groups regarding 1minute APGAR scores (massage group 7.9 ± 0.2 and control group	**Strengths:** -Many factors were looked at in this study: pain, length of 2nd stage, APGAR scores, and satisfaction. -Control group -RCT **Limitations:** -small sample size -the study was limited to measuring the length of the second stage of labor and could have benefited from measuring the length of the first stage as well -the study did not separate nulliparous women from multiparous women when evaluating duration of labor

group. Setting: Celal Bayar University Hafsa Sultan Hospital, Turkey between Nov 1st, 2013 and Nov 1st, 2014. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	The control group received routine care and pain was measured at the same three times. Instruments: Visual Analog Scale (0-10) Delivery Room Observation Form. Interview questionnaire Linda Kimber's massage protocol	7.8 ± 0.3, $p>0.05$). Satisfaction scores were 8.8 ± 0.7 in the massage group and 6.9 ± 0.8 in the control group which was a statistically significant difference ($p<0.05$). **Conclusion:** The results of this study showed that lower back massage during labor can provide significant reduction of pain and increase satisfaction of birth.	
Author Recommendations: Recreate study with a larger sample size. Providers dealing with pregnant women should attend courses to learn and develop these skills so that they can better their care. Nursing schools should add nonpharmacological pain relief methods to their curriculum.			
Implications: Massage is an effective nonpharmacological intervention for the laboring patient. With proper education of nonpharmacological interventions, nurses and providers can provide a safe, non-invasive approach to reducing pain and improve patient satisfaction by providing them with a positive interaction.			

Source:
Afefy, N. (2015). Effect of ice cold massage and acupressure on labor pain and labor duration: a randomized controlled trial. *Journal of Natural Sciences Research, 5*(22), 137-143. Retrieved from https://www.iiste.org/Journals/index.php/JNSR/article/viewFile/27143/27826

Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To determine the effectiveness of ice-cold massage and acupressure on reducing labor pain as well as reducing the duration of labor. **Sample/Setting:** 300 laboring women recruited from the maternity university hospital, Egypt. (n=100) in the ice massage group, (n=100) in the acupressure group, and (n=100) in the control group. All women were free from chronic diseases, were between the ages of 20-30, were primigravida, nulliparous, were carrying a singleton term fetus, had a normal fetal heart rate, had intact membranes, and were in the early active phase. Women who used	Study design: Randomized controlled trial. Methods: The ice-cold massage group had a ice bag applied to the Hugo point (L14) on both hands during a contraction. For a total of 20 minutes, massage was given to the same point for 1 minute on, 1-minute rest, and repeat. The acupressure group received pressure to the Hugo point, performed the same way as the ice massage group. The control group was given routine hospital care. Labor pain was measured immediately after the treatment was given, at 30 minutes, and at 60 minutes. Instruments: Structured interview questionnaire Partograph for labor and delivery Visual Analogue Scale (VAS) (0-10) Crushed ice bag	There was a statistically significant difference when comparing the 3 groups before and after intervention when it came to pain intensity. Immediately after intervention ice-cold group 4.66, acupressure group 4.70, and control group 5.01 ($p<0.003$), 30 minutes post intervention ice-cold group 4.71, acupressure group 4.91, and control group 5.14 ($p<0.002$), and 1 hr. post intervention ice-cold group 4.86, acupressure group 5.08, and control group 6.01 ($p<0.02$). Duration of labor was also found to have a statistically significant difference when comparing the intervention groups with the control group for the first and second stage of labor ($p<0.003$; $p<0.04$). 1st stage: ice-cold group: mean of 6.72 hrs. Acupressure group: mean of 6.28 hrs. Control group: mean of	**Strengths:** -large sample size -RCT -well controlled with sample selection -all women were nulliparous -women were excluded from the study if they needed analgesic drugs or use of interventions to accelerate their labor **Limitations:** -massage was limited to only 20 minutes -unsure if it was the ice or the massage that made the difference -only women who had no complications were included in the study

analgesic drugs or medications to accelerate labor were not included in this study. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** High quality		8.49 hrs. 2nd stage: ice-cold group: mean of 28.05 min. Acupressure group: mean of 30.45 min. Control group: mean of 37.02 min. There was no significant difference found when it came to the third stage of labor; ice-cold group mean of 6.87 min., acupressure group mean of 6.69 min., and control group mean of 6.92 min. (p=0.28). **Conclusion:** Ice massage and acupressure can be successfully used in primigravida women to reduce labor pain intensity and duration of labor. Although both interventions appeared to be effective in decreasing pain, ice massage was more successful. It would be beneficial to repeat the interventions every 30 minutes to get optimal pain reduction.	
Author Recommendations: To repeat the study with application of ice massage and acupressure being given for longer than 30-minute intervals as well as using multiple acupressure points instead of just the Hugo point. Recreate the study with a larger sample size.			

Implications:
Ice massage and acupressure are effective nonpharmacological interventions at reducing labor pain and duration of labor. It is non-invasive, easy to use, and does not cause adverse effects to mom or baby. This can be a good alternative to pharmacological therapy when it is not available, or the women do not want to use it.

Source: Bolbol-Haghighi, N., Masoum, S. Z., & Kazemi, F. (2016). Effect of massage therapy on duration of labor: a randomized controlled trial. *Journal of Clinical and Diagnostic Research, 10*(4), 12-15. doi: 10.7860/JCDR/2016/17447.7688			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To answer the question, how does massage therapy affect the duration of labor. *Secondary Aim:* Evaluate APGAR scores at 1 and 5 minutes and type of delivery. **Sample/Setting:** 100 healthy pregnant women in the age range of 18-45 years, carrying a single live fetus with a reactive NST and no pregnancy complications were included into the trial. (n=50) in the intervention massage group and (n=50) in the control group. The study took place at Fatemieh Hospital, Iran between October 2013 and June 2015.	Study design: Randomized controlled trial. Methods: The massage group was given a massage by a trained midwifery student for at least 30 minutes to the under belly, upper thighs, sacral region, shoulders, and legs. The control group was given routine hospital care. Instruments: Four-section check list that covered demographic and obstetric characteristics, evaluation form, first and second stage of labor, infant information, and partogram.	Massage proved to make a statistically significant difference in duration of labor for both the 1st stage and 2nd stage when compared to the control group (1st stage: massage group 8.96 ± 5.31 and control group 11.46 ± 3.71, $p<0.0001$ and 2nd stage: massage group 49.29 ± 27.86 and control group 64.14 ± 34.67, $p=0.003$). Massage also showed a statistically significant difference when it came to 1- and 5-minute APGAR scores (1-minute APGAR: massage group 8.55 ± 0.74 and control group 7.82 ± 0.93, $p<0.0001$ and 5-minute APGAR: massage group 9.36 ± 0.71 and control group 8.92 ± 0.90, $p<0.0001$). There was not a significant difference between the two groups when it came to the type of delivery ($p=0.17$). Vaginal delivery: massage group 49 (98%) and control group 47 (94%). Cesarean delivery:	**Strengths:** -there were no exclusion criteria for number of deliveries as there were in other similar studies -massage therapy was performed by trained midwifery students -individuals were trained how to use a partogram to evaluate the labor progress -reactive NST is a good inclusion criterion **Limitations:** -small sample size -the study was not blinded

Johns Hopkins Evidence Appraisal: **Strength:** Level I **Quality:** Good quality		massage group 1(2%) and control group 3(6%). There was a significant difference between the intervention group and control group when looking at labor progress ($p<0.0001$). In the intervention group 19% passed the alert line on the partogram compared to 44% in the control group. **Conclusion:** Massage is an effective non-invasive intervention to shorten duration of labor in both the 1st and 2nd stage as well as improves APGAR scores at both 1 minute and 5 minutes and labor progress.	
Author Recommendations: Conduct other studies to determine other effects massage can have on labor and delivery. It would also be beneficial to conduct more studies with larger sample sizes.			
Implications: With proper training, massage techniques can be used effectively to shorten duration of labor, improve APGAR scores, and improve labor progress for all women regardless of their gravida. It is a safe, non-invasive and accessible non-pharmacological intervention with effectiveness for the laboring patient.			

Source: Rai, R., Uprety, D. K., Pradhan, T., Bhattarai, B. K., & Acharya, S. (2013). Subcutaneous sterile water injection for labor pain: a randomized controlled trial. *Nepal Journal of Obstetrics and Gynaecology, 8*(2), 68-70. doi: 10.3126/njog.v8i2.9777			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: The aim of the study was to study how effective subcutaneous injections of sterile water are at reducing labor pain. **Sample/Setting:** 240 term healthy pregnant women in the active phase of labor with a cervical dilation of >4cm and severe low back pain (>/=7) who had not received any other analgesics were selected for this study. The study participants were at BP Koirala institute of health sciences. (n=120) in the intervention group and (n=120) in the control group. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	Study design: Randomized single blind controlled trial. Methods: The intervention group was given the subcutaneous sterile water injections. Injections were given in 4 sites in the lumbosacral region - Michaelis' rhomboid. The control group was given subcutaneous injections of isotonic saline in the same areas that the intervention group received the injections. Each injection contained 0.1ml of fluid. Pain was monitored before the injections and at 10, 45, and 90 minutes after the injections were administered. Instruments: Visual Analogue Scale (VAS) (0-10)	There was no difference between the two groups regarding pain before the intervention took place. Pain was decreased in both groups at 10, 45, and 90 minutes with a greater reduction in the intervention group. 10 min: intervention: 3.64 ± 2.93, control: 7.63 ± 2.16 ($p<0.001$) 45 min: intervention: 3.27 ± 2.68, control: 7.69 ± 2.28 ($p<0.001$) 90 min: intervention: 3.32 ± 2.68, control: 4.63 ± 0.82 ($p<0.001$) The difference was statistically significant. **Conclusion:** Subcutaneous sterile water injections are effective in reducing pain experienced by labor.	**Strengths:** -larger sample size than other studies conducted -no other pain medications were used -RCT -blinded **Limitations:** -pain was only assessed up to 90 minutes -maximum duration of pain relief was not assessed -the intervention was only provided one time and can be provided more than once

Author Recommendations: No recommendation was offered.
Implications: Sterile water injections can be done by midwives and can be used for those women who do not want an epidural or narcotics due to the side effects as an effective form of pain reduction. It can be used at a birth center and places were an epidural is not an option. Sterile injections can also be used to allow women to have pain relief and still be able to be mobile. It is a safe, easy, and effective nonpharmacological intervention.

Source: Koyucu, R. G., Demirci, N., Yumru, A. E., Salman, S., Ayanoglu, Y. T., Tosun, Y., & Tayfur, C. (2018). Effects of intradermal sterile water injections in women with low back pain in labor: a randomized controlled clinical trial. *The Balkan Medical Journal, 35*(1), 48-54. doi: 10.4274/balkanmedj.2016.0879			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine how effective sterile water injections are at relieving back pain for women in labor and to evaluate the level of satisfaction. *Secondary Aim:* To compare mode of delivery, APGAR scores, Women's satisfaction with pain relief, and breastfeeding. **Sample/Setting:** 168 healthy singleton term pregnant women aged 18-35 with a spontaneous onset of labor, in the active phase of the 1st stage (3-7cm), expecting a vaginal delivery, baby in a cephalic presentation, with severe lower back pain (7/10) needing pain relief	Study design: Randomized prospective study. Methods: SWG received 4 intradermal injections of 0.1ml sterile water surrounding the rhombus of Michaelis. DIG received 4 dry injections in the same way as the SWG group. For both groups the injections were administered at the peak point of the contractions. Pain was assessed before the intervention, and 10, 30, 60, 120, and 180 minutes after in the intervention. Instruments: Visual Analog Scale (VAS) (0-100) A Satisfaction Questionnaire Infant Breastfeeding Assessment Tool (IBFAT) Case form Partograph	At 30 minutes after the injections, pain was significantly lower in the SWG than DIG (SWG: 31.66 ± 11.38; DIG: 75 ± 18.26, $p<0.01$). This was also the case for 10, 60, 120, and 180 minutes. 10 min (SWG: 45 ± 10.35; DIG: 75.35 ± 17.45; $p<0.01$) 60 min (SWG: 22.07 ± 12.91; DIG: 73.1 ± 17.35; $p<0.01$) 120 min (SWG: 23.58 ± 12.99; DIG: 75.46 ± 14.24; $p<0.01$) 180 min (SWG: 59.25 ± 16.69; DIG: 75.19 ± 12.6; $p<0.01$). SWG has a significant greater decrease in mean pain scores compared to DIG at 10 min (SWG: 41.48 ± 6.97; DIG: 12.97 ± 11.06), 30 min (SWG: 54.82 ± 7.81; DIG: 13.33 ± 12.05), 60 min (SWG: 64.22 ± 8.15; DIG: 15.81 ± 10.98, 120 min (SWG: 62.16 ± 8.88; DIG: 13.28 ± 8.91), and 180 min (SWG: 26.20 ± 13.56; DIG: 10.96 ± 8.46)	**Strengths:** -multiple factors were looked at; pain relief, maternal satisfaction, delivery mode, APGAR scores, and breastfeeding **Limitations:** -small study sample

were included in the study. (n=84) in the sterile water injection (SWG) group and (n=84) in the dry injection group (DIG). The study took place between June 2013 and March 2014 in a maternity unit in Turkey. **Johns Hopkins Evidence Appraisal: Strength:** Level I **Quality:** Good quality		(P<0.01). The rate of c-section was SWG 10.7% and DIG 20.2% (p=0.08). This was not statistically significant. Those that received epidurals between the two groups was also not significant (SWG: 4.76%, DIG: 9.52%, p=0.231). Also not statistically significant was the time from first injection to delivery although it was shorter in the SWG (SWG: 170 ± 53.4 mins; DIG: 180 ± 62.65 min.; p=0.06). APGAR scores were similar between the two groups. 1 min: SWG: 8.48 ± 0.5; DIG: 8.6 ± 0.49; p=0.122. 5 min: SWG: 9.77 ± 0.42; DIG: 9.76 ± 0.42; p=0.855. Satisfaction levels were significantly higher in SWG compared to DIG (SWG: 71 (84.5%); DIG: 30 (35.7%); p=0.01). At 1 hr. postpartum and at 1 day old the breastfeeding scores were similar between	

		the two groups. 1hr. SWG: 9.69 ± 1.54; DIG: 9.34 ± 1.48; p=0.181. 1-day SWG: 10.32 ± 1.49; DIG: 10 ± 1.27; p=0.145. **Conclusion:** Sterile water injections can be an effective intervention to relieve back pain caused by labor in the first stage of labor as well as to provide maternal satisfaction.	
Author Recommendations: Future studies need to be done in other countries to look at the effectiveness of sterile water injections on mode of delivery and c-section rates.			
Implications: Sterile water injections are an effective nonpharmacological intervention that can be used to treat lower back pain during labor without negative side effects such as changes in vital signs, changes in consciousness, and immobilization. It can provide effects for up to 120 min and can be done more than once. It is easily accessible and can be done by the midwife.			

Source: Saxena, K. N., Nischal, H., & Batra, S. (2009). Intracutaneous injections of sterile water over the secrum for labour analgesia. *Indian Journal of Anaesthesia, 53*(2), 169-173. Retrieved from https://www.ncbi.nlm.nih.gov/pubmed/20640118			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* The aim of the study was to determine how effective intracutaneous sterile water injections were at relieving back pain caused by labor. *Secondary Aim:* To compare delivery time and APGARs. **Sample/Setting:** 100 healthy pregnant women admitted to Lok Nayak hospital, India who were in their first stage of labor with a cervical dilation around 4 cm and requiring relief from lower back pain were included in this study. Those with an infection in the area where the injection would go were excluded. (n=50) in the intervention group	Study design: Randomized double-blinded controlled trial. Methods: The intervention group was given 4 injections in the lumbar-sacral region intracutaneously of 0.5ml of sterile water. The control group was given injections in the same regions of 0.5ml isotonic saline. The level of pain was assessed before intervention and at 10 min, 45 min, and 90 min after the intervention was completed. Instruments: Visual Analogue Scale (VAS) (0-100)	There was no significant difference between the groups regarding pain prior to intervention (sterile water group 75.3 ± 23.04; normal saline group 74.7 ± 23.45; p=0.29) There was a statistically significant difference between pain scores at 10 min (sterile water group 34.2 ± 28.70), 45 min (sterile water group 33.2 ± 32.67), and 90 min (sterile water group 49.3 ± 33.96) when compared to the pain score at 0 min in the sterile water group ($p<0.005$). There was not a significant difference in pain scores when it came to the isotonic saline (control) group. 10 min (normal saline group 73.4 ± 23.48) 45 min (normal saline group 77.4 ± 20.78) 90 min (normal saline group 83.7 ± 18.81) When the two groups were compared for pain scores there was also a	**Strengths:** -no other pain relief was used during the study -effective sample size **Limitations:** -only looked at the first stage of labor -pain assessment was limited to 90 minutes

and (n=50) in the control group. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality		significant difference between the two groups at all three times ($p<0.05$) VAS at 10 min: Sterile water 34.2 ± 28.70 Normal saline 73.4 ± 23.38 VAS at 45 min: Sterile water 33.2 ± 32.67 Normal saline 77.4 ± 20.78 VAS at 90 min: Sterile water 49.3 ± 33.96 Normal saline 83.7 ± 18.81 There was not a significant difference between the mean period between injections and delivery. Sterile water group: 4.01 ± 2.15 hrs., normal saline group: 4.17 ± 2.30 hrs. There was not a significant difference between the two groups when it came to APGAR scores. Sterile water group: 8.7 ± 0.5 and normal saline group: 8.58 ± 0.15. **Conclusion:** Sterile water injections are effective at reducing low back pain with an effect lasting 45-90 minutes.	

Author Recommendations: To further evaluate the effectiveness of sterile water injections during the 2nd stage of labor.			
Implications: Sterile water injections are an intervention that can be employed by the patient's midwife to reduce lower back pain caused by labor. This nonpharmacological intervention is safe and easy to use and is provided with no negative side effects other than pain during injection that lasts a few seconds. Sterile water injections can keep the patient comfortable anywhere from 45-90 minutes and can be repeated if needed.			

Source: Hamlact, Y., & Yazici, S. (2017). The effect of acupressure applied to point LI4 on perceived labor pains. *Holistic Nursing Practice, 31*(3), 167-176. doi: 10.1097/HNP.0000000000000205			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To study effectiveness of acupressure on LI4 for reducing labor pain. *Secondary Aim:* To compare labor duration, behaviors of pregnant women during labor, and postlabor pain. **Sample/Setting:** 88 healthy pregnant women with a term singleton pregnancy and an estimated fetal wright of 2500 to 4000 grams who has had no pregnancy complications or systemic diseases during pregnancy, has gone into labor spontaneously with a cervical dilation < 5cm and had planned to have a spontaneous	Study design: Randomized controlled trial. Methods: The acupressure group received acupressure at the LI4 point bilaterally 8 times at cervical dilation 4-5 cm and again 8 times at 7-8 cm at a mean pressure of 3-5 kg. The control group received routine healthcare. Pain was recorded using VAS at admission, before the 1st application, after the first application, before the second application, and after the second application. Instruments: Pregnant information form Labor monitoring form Postpartum Interview form Visual Analog Scale (VAS) (0-10) Punctometer	After first application of acupressure there was a statistically significant difference between VAS scores (study group: 3.77 ± 1.3, control group 6.22 ± 1.14, p=.0001). This was also the same after the second application (study group 7.57 ± 1.27, control group 8.61 ± 0.71, p=.0001). Cervical dilation on admission between the two groups were similar (study group: 3.38 ± 0.86, control group: 3.22 ± 1.09). After the first application of acupressure there was a statistically significant difference between the two groups of cervical effacement (study group: 69.54 ± 5.26, control group: 66.59 ± 6.44, p=.021). The behaviors between the two groups during labor were also statistically significant (p<.05). Ongoing postlabor pain occurred in 25% of the study group and 45.5% of the control group	**Strengths:** -look at multiple factors; labor pain, length of labor, and behaviors during labor -RCT **Limitations:** -small sample size -limited to one acupressure point -the study was not blinded

vaginal delivery were included in the study. (n=44) in the acupressure group and (n=44) in the control group. The study took place at T.R. Ministry of Health Bagcilar Training and Research Hospital, Turkey. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality		making it statistically significant (p=.04). **Conclusion:** Acupressure at the LI4 spot in effective in reducing labor pain, shortening the length of labor, and improving behaviors during labor.	
Author Recommendations: Recreate the study using more than one acupressure point and with a larger sample size.			
Implications: Acupressure is an effective nonpharmacological intervention to reduce labor pain and reduce length of labor. It can be a good intervention to offer to women who prefer methods other than pharmacological methods, can help them manage their deliveries, and appreciate their delivery.			

Source: Dabiri, F., & Shahi, A. (2014). The effect of LI4 acupressure on labor pain intensity and duration of labor: a randomized controlled trial. *Oman Medical Journal, 29*(6), 425-429. doi: 10.5001/omj.2014.113			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To study the effectiveness of acupressure on LI4 for reducing labor pain and duration of first stage of labor. *Secondary Aim:* To look at the comparison of type of delivery and APGAR scores at one and five minutes. **Sample/Setting:** 149 women with a healthy singleton pregnancy that is between 37-42 weeks gestation, in a cephalic presentation, a cervical dilation of 4-5 cm, who went into spontaneous labor and who has no history of a previous high-risk pregnancy, no previous cesarean section, no cephalopelvic disproportion, and who had not taken	Study design: Randomized controlled trial, single-blinded Methods: The acupressure group received bilateral pressure to Hugo point (LI4) by a trained midwife who was certified in the acupressure method. The woman was to take a deep breath and then pressure was applied for 60 seconds, then the woman rested for 60 seconds, and it was repeated for a total of 30 minutes. The touch group was touched without pressure on the Hugo point (LI4) in the same fashion as the acupressure group. The control group received traditional care without using a form of pain relief. Pain was measured in each group before intervention, at 30 minutes after the intervention, one hour after the intervention, and every hour following until the end	Pain significantly decreased in the acupressure group (before intervention: 6.48 ± 2.23, 30 mins. after intervention: 5.65 ± 1.87, one hr after intervention: 6.51 ± 2.21; p=0.110). Pain increased in both the touch group and the control group. (Touch group: before intervention: 6.23 ± 2.24, 30 mins. after intervention: 6.85 ± 1.89, one hr after intervention: 7.64 ± 2.22; p<0.001). (Control group: before intervention: 6.55 ± 1.92, 30 mins. after intervention: 8.18 ± 1.59, one hr after intervention: 8.68 ± 1.54; p<0.001). There was no significant difference between groups when it came to duration of first stage of labor (p=0.942), type of delivery (p=0.840), and APGAR scores at one and five minutes (p=0.621). **Conclusion:** Acupressure at Hugo	**Strengths:** -Many factors were looked at in this study: pain, duration of labor, APGAR scores, and type of delivery. - two control groups to remove the placebo effects of indoctrination and physical presence -RCT **Limitations:** -maternal anxiety and fear were not assessed -small study group -control group was not allowed any pain relief

a narcotic in the last 8 hours. (n=50) in the acupressure group, (n=50) in the touch group, and (n=49) in the control group. The study took place in Iran at Dr. Shariati University Hospital between October 2011 to April 2012. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	of the first stage of labor. Instruments: Visual Analog Scale (0-10)	point (LI4) is effective at elevating labor pain, however, it does not have an effect on the duration of the first stage of labor.	
Author Recommendations: Recreate the study using a larger sample size and incorporating other techniques to apply pressure on different parts of the body.			
Implications: Acupressure is an easy and effective non-pharmacological intervention for labor pain and eliminates side effects for the mother and the baby. It is also easy for a midwife to get certified in acupressure.			

Source: Torkzahrani, S., Ghobadi, K., Heshmat, R., Shakeri, N., & Aria, K. J. (2015). Effect of acupressure on cervical ripening. *Iranian Red Crescent Medical Journal, 17*(8), 1-7. doi: 10.5812/ircmj.28691			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: To study the effectiveness of acupressure was on cervical ripening. **Sample/Setting:** 150 healthy primigravida women aged 18-35 years with a term, cephalic presentation, low risk pregnancy with a normal non-stress test, a bishop score of </=4 and who had not had sexual intercourse for the past 24 hours or used herbal or chemical drugs in the last 36 hours were included in this study. The study took place at the Dezyani medicine center, Iran between June 2011 to December 2012. (n=50) received traditional Chinese medicine acupressure that was performed by	Study design: Randomized controlled trial. Methods: The group receiving traditional Chinese medicine acupressure by the researcher received pressure on the spleen 6 spot for 1-5 sessions between the hours of 9am-11am. Pressure was applied for 10 seconds to 2 minutes depending on when half of the fingernails turned white and then they were able to rest for the equal amount of time. This was done for a total of 20 minutes each day following one direction on the right foot. The group receiving acupressure from the women herself was trained to do the same process as the group receiving acupressure from the researcher. The control group received routine healthcare. Vaginal exams were performed on all three groups every 48 hours	48 hours after the start of the study there was no statistically significant difference of Bishop scores between the groups. 4.88 ± 1.83, 5.12 ± 1.92, 4.06 ± 1.59 ($p<0.012$). AT 96 hours there was still no significant difference in Bishop scores between the groups. 5.08 ± 1.77, 5.21 ± 1.75, 5.04 ± 1.96 ($p=0.95$). At hospitalization there was a statistically significant difference between the three groups 5.95 ± 2.02, 6.02 ± 1.68, 5.02 ± 2.03 ($p<0.02$). Researcher performed acupressure compared to the control group for Bishop scores was ($p=0.028$) and self-performed acupressure compared to the control group for Bishop scores was ($p=0.014$). **Conclusion:** Acupressure on the spleen 6 spot could be an effective intervention	**Strengths:** -there was an intervention group aimed towards the mothers -one acupressure spot was chosen to study instead of multiple spots -no placebo was used **Limitations:** -only studied primigravida women -the study was not blinded

the researcher, (n=50) in the acupressure group where acupressure was performed by the mother, and (n=50) in the control group. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	to determine their Bishop score. Instruments: Bishop score	for cervical ripening especially when performed by the woman herself. Although at 96 hours there was not a statistically significant difference noted there was still an increase in Bishop score in the acupressure groups when compared to the control group.	
Author Recommendations: No recommendations were offered.			
Implications: Acupressure is an easy intervention that is free of side effects that can be used to aid in cervical ripening. This nonpharmacological intervention can be taught to the pregnant women so that she can practice it home which can help prevent problems of referring to a hospital and the related costs.			

Source: Mafetoni, R. R., & Shimo, A. K. K. (2015). Effects of acupressure on progress of labor and cesarean section rate: randomized clinical trial. *Revista de Saude Publica, 49*(9), 1-9. doi: 10.1590/S0034-8910.2015049005407			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To study how acupressure at the SP6 point can affect labor and cesarean rates for parturient women. *Secondary Aim:* Comparison of APGAR scores. **Sample/Setting:** 153 healthy term pregnant women with a live fetus in cephalic position, dilation at >/= 4 cm, 2-3 contractions every 10 minutes, and undamaged skin at the SP6 points were included in this study. The study took place at a tertiary public teaching hospital in Brazil between January and August 2013. (n=51) in the acupressure group, (n=51) in the touch group, and (n=51) in the control group.	Study design: Randomized controlled trial; double blinded Methods: The acupressure group was given brisk to and rapid decompression of medium-intensity pressure to the SP6G for a period of 20 minutes during contractions. The touch group received superficial touch with low-intensity pressure for the same amount of time as the acupressure group. The control group received traditional healthcare. Instruments: Questionnaire Kruskal-Wallis test	Total labor duration was statistically different between the acupressure group and touch group (acupressure group 628.1, touch group 891.4, p=0.0093) and between the acupressure group and the control group (acupressure group 628.1, control group 913.1, p=0.0041). There was not a significant difference between the touch group and the control group (p=0.8802). There was not a statistically significant difference regarding cesarean section rates (acupressure group 14 (26.9%), touch group 19 (36.6%), control group 22 (42.3%), p=0.2526) or APGAR scores at 1 minute (acupressure group 8.5, touch group 8.17, control group 8.3, p=0.9542) and 5 minutes (acupressure group 9.6, touch group 9.54, control group 9.3, p=0.7218.	**Strengths:** -the person in charge of acupressure was provided 32 hrs. of training to insure consistency of pressure -RCT **Limitations:** -uterotonics were used in some patients in conjunction with the acupressure- -study took place at a university hospital where more high-risk pregnancies are referred maybe causing more medical interventions to be used -the control group was not blinded -a larger group may be needed for the differences to show significant differences

Johns Hopkins Evidence Appraisal: **Strength:** Level I **Quality:** Good quality		**Conclusion:** Providing acupressure to SP6 for 20 minutes can be a complementary intervention to augment or shorten labor, however, there is no benefit when it comes to cesarean rate.	
Author Recommendations: Further studies are needed to look at the physiological mechanisms that occur in the mother's body when acupressure is provided.			
Implications: Acupressure can be a good nonpharmacological intervention to use for women who prefer less invasive methods when it comes to labor augmentation and will not cause adverse effects for the mother or newborn. This intervention can be performed by both nurses and providers and does not require prolonged training.			

Source: Yildirim, E., Alan, S., & Gokyildiz, S. (2018). The effect of ice pressure applied on large intestinal 4 on the labor pain and labor process. *Complementary Therapies in Clinical Practice, 32,* 25-31. doi: 10.1016/j.ctcp.2018.02.015			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To study the effectiveness of LI4 acupressure on the birth process and perception of labor pain when done at 40 minutes and 80 minutes. *Secondary Aim:* To compare maternal vital signs, fetal heart rates, APGAR scores, contraction times and magnitude, cervical dilation, and episiotomy rates. **Sample/Setting:** 72 healthy pregnant women with a term singleton pregnancy with a cervical dilation between 4-8 cm with no pregnancy complications, contraction anomalies, or systemic disease	Study design: Randomized controlled trial. Methods: The experimental group was given ice bags filled with 30cc of water and frozen to hold on the LI4 region bilaterally at the start of each contraction and through the contraction for 80 minutes. Ice bags were put down during rest periods between contractions. The control group received traditional healthcare. VAS scores were evaluated in both groups before treatment, at 40 minutes post intervention, and 80 minutes post intervention. Instruments: Pregnant Identification Form Partogram Monitoring Form Related to Labor Visual Analog Scale (VAS) (0-10)	VAS scores significantly decreased with the use of acupressure ($p=0.001$). Before application VAS scores were control group 6.33 and experimental group 7.33, at 40 minutes after application control group 7.28 and experimental group 7.11, and at 80 minutes after application control group 8.61 and experimental group 5.25. There was no statistically significant difference in the two groups at 40 minutes in regard to the mean pulse and respiratory ratio ($p>0.05$). At 80 minutes there was a statistically significant difference ($p<0.05$). In regard to fetal heart rates, at 40 minutes the control group was 146.11 ± 10.90 compared to the experimental group 146.17 ± 12.55 with a p-value of 0.984. At 80 minutes there was a statistically significant	**Strengths:** -looked at many factors: pain, maternal vital signs, fetal heart rates, APGAR scores, contraction times and magnitude, cervical dilation, and episiotomy rates. **Limitations:** -small sample size -only looked at one acupressure point -study was not blinded

was included in this study. Women with a labor induction, using narcotic analgesics, irregular contractions, in the latent or transition phase, or was primipara were excluded from the study. (n=36) in the experimental group and (n=36) in the control group. The study took place between December 2012 and May 2013 at Adana Maternity and Children Hospital, Turkey. **Johns Hopkins Evidence Appraisal: Strength:** Level I **Quality:** Good quality		difference between the two groups 146.67 ± 11.72 compared to 139.50 ± 10.44 (p=0.008). APGAR scores between the two groups were similar (p>0.05). There was a statistically significant difference in favor of the experimental group with contraction times and magnitudes at 80 minutes (p<0.05). Frequency of contractions: experimental group 3.22 ± 1.65 and control group 3.89 ± 1.80. Intensity of contractions: experimental group 78.58 ± 9.12 and control group 70.86 ± 11.53. Acupressure significantly shortened the duration of labor (p<0.001). Episiotomy rates were lower in the experimental group (30.6 % compared to 58.3% in the control group) with a statistically significant difference (p=0.032)	

		Conclusion: Ice massage at the LI4 region can have a positive effect on the labor process, can reduce labor pain, and can shorten the length of labor.	
Author Recommendations: No recommendations were offered.			
Implications: Ice massage at LI4 is an effective nonpharmacological intervention for reducing labor pain and shortening labor duration. It is easily used, is non-invasive, and provides no negative effects to mom or baby.			

Source: Torkzahrani, S., Mahmoudikohani, F., Saatchi, K., Sefidkar, R., & Banaei, M. (2017). The effect of acupressure on the initiation of labor: a randomized controlled trial. *Women and Birth, 30*, 46-50. doi: 10.1016/j.wombi.2016.07.002			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To evaluate the effectiveness of acupressure on the initiation of labor. *Secondary Aim:* To compare type of birth and fetal complications. **Sample/Setting:** 162 healthy nulliparous low risk pregnant women with a gestational age of 39-40 weeks, a singleton cephalic presentation, between the ages 18-35, a normal BMI, Bishop score </= 4, BPP 8/8, not taking herbal or chemical drugs in the last 36 hours and not having sexual intercourse in the last 24 hours was included in the study. (n=54) in the acupressure group, (n=55) in the sham acupressure group, and (n=53) in the routine care group.	Study design: Randomized controlled trial. Methods: The acupressure group received acupressure between 9am and 11am at bladder 32, spleen 6, and bladder 60 for a total of 5 times in each location. Pressure was applied for 1 min and then the patient rested for 1 min. This was done every other day. The sham acupressure group received treatment in the same way, but pressure was provided to 3 ineffective points. The routine group received routine healthcare. After being trained for the acupressure points the women performed another session of acupressure in the evenings on the days the researcher did it and in the morning and the evening on the days the researcher did not do it. The women were examined at 48 hrs., 96 hrs., and at the time of	There was no statistically significant difference between the 3 groups with spontaneous initiation of labor at 48hrs. (15 (30%) in acupressure group, 10 (20%) in sham acupressure group, and 11 (22%) in routine care group, p=0.464). There was also not a significant difference at 49-96 hrs. (7 (14%) in the acupressure group, 17 (34%) in the sham acupressure group, and 12 (24%) in the routine care group, p=0.111) and at the time of hospitalization (28 (56%) in the acupressure group, 28 (56%) in the shame acupressure group, and 30 (60%) in the routine care group, p=0.897). There was no significant difference in mean interval from procedure to birth. Acupressure group 124.88 ± 75.93 Sham acupressure group 135.39 ± 70.09 Routine care group 114.16 ± 52.64	**Strengths:** -looked at multiple factors: initiation of labor, type of birth, and fetal complications. -RCT **Limitations:** -small sample size -there were restricted factors in the trial related to the fear of fetal complication -the person initiating acupressure was not present for other labor care

The study took place between April 2015 and November 2015 at Shahid Akbar Abadi hospital, Iran. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	hospitalization. Treatment was continued until the end of 41 weeks. Instruments: Demographic and Obstetric Date questionnaire Daily record and follow up forms	(p=0.565). There was no significant difference in type of birth. Normal vaginal birth 28 (56%) in acupressure group, 24 (48%) in sham acupressure group and 26 (52%) in the routine care group (p=0.726). Cesarean birth 22 (44%) in the acupressure group, 26 (52%) in the sham acupressure group, and 24 (48%) in the routine care group (p=0.726). There was no significant difference in APGAR scores at 1 minute and 5 minutes. 1 min: 8.30 ± 0.46 in the acupressure group, 8.34 ± 0.48 in the sham acupressure group, and 8.40 ± 0.49 in the routine care group (p=0.574). 5 min: 9.10 ± 0.30 in the acupressure group, 9.08 ± 0.27 in the sham acupressure group, and 9.06 ± 0.24 in the routine care group (p=0.736). **Conclusion:** Acupressure is not effective in the initiation of labor and does not affect the type of delivery.	

Author Recommendations: Recreate the study with a larger sample size.			
Implications: Acupressure was not an effective nonpharmacological intervention for initiating labor in this study. This could be due to the fact that the women were performing acupressure on their own every other day and they may not be doing it exactly the same way as the researcher.			

Source: Mansouri, E., Kordi, M., Aval, S. B., Shakeri, M. T., & Mirteimouri, M. (2018). Comparison of the effect of pressure on bladder-GV20 and gallbladder-GV20 on labor pain intensity among the primiparous women: a randomized clinical trial. *Evidence Based Care Journal, 8*(3), 7-16. doi: 10.22038/ebcj.2018.31495.1783			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To compare 3 acupressure points of the bladder to 4 acupressure point of the gallbladder for effectiveness of decreasing pain intensity during labor. *Secondary Aim:* Compare the duration of uterine contractions. **Sample/Setting:** 165 primiparous healthy pregnant women at term with a singleton vertex fetus, between the ages of 18-35, with a fetal weight of 2500-4000 g, at 4-5 cm dilated with at least 2 contractions in 10 minutes, with no obstetric or medical problems and has a pain intensity >/=50 mm was included in this study.	Study design: Single-blind randomized clinical trial. Methods: Group 1: acupressure was applied to bladder points BL5, BL8, BL9, and GV20 during the first stage of labor for 60 seconds in each location for a total of 5 4-minute cycles at the onset of a uterine contraction and again during the second stage of labor for 1 4-minute cycle. Group 2: acupressure was applied to gallbladder points GB8, GB16, GB17, GB18, and GV20 during the first stage of labor for 60 seconds in each location for a total of 4 5-minute cycles at the onset of a uterine contraction and again during the second stage of labor for 1 4-minute cycle. Control group was given routine healthcare. Pain intensity was	There was a statistically significant difference between the 3 groups concerning the mean labor pain intensity immediately after the intervention (bladder group 33.2 ± 7.4, gallbladder group 24.2 ± 6.0, and control group 83.2 ± 10.1, $p<0.001$) and at 30 minutes post intervention (bladder group 71.5 ± 8.1, gallbladder group 59.5 ± 6.4, and control group 87.5 ± 8.7, $p<0.001$) during the first stage of labor. The gallbladder group had a lower pain intensity when compared to the bladder group and control group with a statistically significant difference at 30 minutes post intervention ($p<0.001$) and during the whole second stage ($p<0.05$). When it came to the mean duration of uterine contractions, a significant difference was found between the 3 groups 30 minutes	**Strengths:** -good sample size -RCT -attempts to show which acupressure points are more effective than others **Limitations:** -there were differing viewpoints regarding acupressure -individual threshold of pain tolerance varied among participants -the routine group was not blinded

(n=55) in the bladder group, (=55) in the gallbladder group, and (n=55) in the control group. The study took place between May 2017 and November 2017 at the Um Al-Benin Specialized Women's Hospital, Iran. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	measured immediately after the intervention, 30 minutes after the intervention, and every 30 minutes until the end of the 1st and 2nd stage of labor. Instruments: Visual Analog Scale (VAS) (0-100) Labor partograph	after each intervention cycle in the first stage of labor (bladder group 54.8 ± 4.9 sec., gallbladder group 59.6 ± 5.9 sec., and control group 49.8 ± 6.0 sec., $p<0.001$), 30 minutes after the last intervention cycle in the first stage of labor (bladder group 52.1 ± 1.7 sec., gallbladder group 57.9 ± 4.1 sec., and control group 43.1 ± 0.3 sec., $p<0.001$), and in the whole active phase of the first stage of labor (bladder group 66.5 ± 5.8 sec., gallbladder group 69.5 ± 3.2 sec., and control group 59.7 ± 56.3 sec., $p<0.001$). When looking at the second stage of labor there was not a significant difference at 30 minutes post intervention (bladder group 72.7 ± 2.3 sec., gallbladder group 74.4 ± 2.3 sec., and control group 70.8 ± 7.5 sec., $p=0.09$) or during the whole second stage of labor (bladder group 80.3 sec. ± 6.3, gallbladder group 82.2 ± 7.2 sec., and control group 79.2 ± 2.3 sec., $p=0.16$). **Conclusion:** Acupressure on the points of the gallbladder	

		and the bladder was effective in reducing labor pain intensity in the first and second stage of labor. Acupressure at the gallbladder points showed the greatest reduction in pain intensity. Acupressure can also increase the intensity and duration of uterine contractions.	
Author Recommendations: Future studies should be done to determine the effectiveness in the second stage of labor if more pressure cycles were utilized.			
Implications: Acupressure to the gallbladder and bladder points is an effective nonpharmacological intervention in relieving the intensity of pain in the first and second stages of labor and can increase uterine contractions in the first stage of labor. It is non-invasive and safe.			

Source: Ozgoli, G., Mobarakabadi, S. S., Heshmat, R., Majd, H. A., & Sheikhan, Z. (2016). Effect of L14 and BL32 acupressure on labor pain and delivery outcome in the first stage of labor in primiparous women: a randomized controlled trial. *Complementary Therapies in Medicine, 29*, 175-180. doi: 10.1016/j.ctim.2016.10.009			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine the effectiveness of LI4 and BL32 acupressure on reducing the severity of pain in the first stage of labor and compare the two acupressure points with each other and with a control group. *Secondary Aim:* To compare the type of delivery and APGAR scores after birth. **Sample/Setting:** 105 healthy term primiparous pregnant women aged 19-35 with a singleton vertex pregnancy in the active phase of the 1st stage of labor with a cervical dilation of >/= 4 cm and at least 3 contractions within 10 minutes with a normal	Study design: Randomized controlled trial. Methods: LI4 group received to the right hand only at the start of a contraction and was stopped at the end of the contraction and was repeated six times. This was done at cervical dilation 4-5cm, 6-7cm, and 8-10cm. The BL32 group received bilateral acupressure in the same manner as the LI4 group. The control group received traditional care with the researcher performing all routine activities except applying acupressure. Pain was assessed after the sixth acupressure in each of the dilations. Instruments: Numerical Rating Scale (NRS)	There was a statistically significant difference in pain intensity in the 1st and 2nd period of intervention between LI4 and control groups (p=0.001, p=0.001), B32 and control groups (p=0.001, p=0.001), and LI4 and B32 groups (p=0.01, p=0.03). There was no significant difference between LI4 and B32 groups during the 3rd period of intervention (p=0.18) but when the intervention groups were compared to the control groups there was a significant difference (p=0.001). There was no significant difference between the groups when it came to mode of delivery and APGAR scores. 1 min: 9 (7-9) in the LI4 group, 9 (7-9) in the BL32 group, and 9 (8-9) in the control group (p=0.57). 5 min: 10 (8-10) in the LI4 group, 10 (9-10) in	**Strengths:** -compared different variables: pain relief, APGARS, and mode of delivery **Limitations:** -acupressure of LI4 was only performed unilaterally

pregnancy were included in the study. (n=35) in the LI4 group, (n=35) in the BL32 group, and (n=35) in the control group. The study took place between August 2008 and November 2008 at Shahid Akbarabadi Hospital, Iran. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality		the BL32 group, and 10 (10) in the control group (p=0.35). **Conclusion:** Acupressure at points LI4 and B32 are effective in reducing labor pain with acupressure at B32 being slightly more effective in the first stage of labor.	
Author Recommendations: Future studies are needed to look at the efficacy of unilateral and bilateral acupressure as well as other acupressure points.			
Implications: Acupressure at LI4 and B32 are effective nonpharmacologic interventions at reducing the severity of pain in the first stage of labor. It is a non-invasive intervention with no adverse effects for the mother of the baby. Intervention done at specific points in labor instead of based on intensity of pain may be a proactive method of reducing overall pain.			

Source: Hamid, N., Obaya, H. E., & Gaafar, H. M. (2013). Effect of acupressure on labor pain and duration of delivery among laboring women attending Cairo University Hospital. *Indian Journal of Physiotherapy and Occupational Therapy, 7*(2), 71-76. doi: 10.5958/j.0973-5674.7.2.016			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine the effectiveness of acupressure at sanyinjiao point (SP6) on pain caused by labor in the primigravida women and the length of labor. *Secondary Aim:* To compare cervical dilation and mode of delivery. **Sample/Setting:** 100 healthy primiparous pregnant women with a term singleton pregnancy, intact membranes, in early active labor (3-4 cm), with a normal fetal heart rate, between the ages 20-30 and could read and write were included in the study. (n=50) in the acupressure group and (n=50) in the control	Study design: Quasi experimental design Methods: The acupressure group received acupressure at sp6 bilaterally for 1minute during each contraction for a total of 30 minutes. The control group received traditional healthcare. Pain, cervical dilation, uterine contractions, and fetal descent was assessed immediately after intervention and 30, 60, and 120 minutes. Instruments: Structure Interviewing Questionnaire Partograph Visual Analog Scale (VAS) (0-10)	There was no statistically significant difference between the two groups with mean pain score before intervention (study group 4.64 ± 0.94, control group 4.48 ± 0.97, p=0.25). There was a statistically significant difference between the two groups immediately after intervention (t=-4.45, p=0.004), at 30 mins. (t=-3.9, p=0.002), at 60 mins. (p=0.02), and at 120 mins. (p=0.03). There was also a statistically significant difference when it came to administering analgesia. 88% did not receive analgesia in the acupressure group and 56% in the control group (p=0.001). Progress in cervical dilation and frequency and duration of contractions were statistically different between the two groups (p<0.001) with women in the acupressure group having better and	**Strengths:** -compared different variables; labor pain, duration of labor, cervical dilation, uterine contractions, and mode of delivery **Limitations:** -small study sample

group. The study took place at Cairo University Hospital, Egypt. **Johns Hopkins Evidence Appraisal:** **Strength:** Level II **Quality:** High Quality		faster progress. (cervical dilation cm/hr: study group 1.23, control group 0.88, $p<0.001$) Duration of labor was significantly shorter in the acupressure group both in the 1st and 2nd stage of labor. (1st stage: 6.02 ± 1.07 hrs. compared to 9.45 ± 2.71 hrs; $p=0.002$) (2nd stage: 23.42 ± 12.00 mins. Compared to 34.89 ± 9.53 mins, $p<0.04$). **Conclusion:** Acupressure at sp6 can effectively manage pain and reduce length of labor by increasing cervical dilation and enhancing contractions in the primiparous woman.	
Author Recommendations: No recommendations were given.			
Implications: Acupressure at sp6 is an effective, non-invasive non-pharmacological intervention with no side effects at managing labor pain and shortening the length of labor. This is a simple intervention that can be administered by anyone. By reducing length of labor, it can decrease maternal complications that can be caused by longer labors.			

Source: Gribel, G. P. C., Coca-Velarde, L. G., & Moreira de Sa, R. A. (2011). Electroacupuncture for cervical ripening prior to labor induction: a randomized clinical trial. *Archive of Gynecology and Obstetrics, 283*(6), 1233-1238. doi: 10.1007/s00404-010-1526-x			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To compare electroacupuncture to misoprostol on its effects on inducing labor in women with a Bishop score of <7 as well as look at the characteristics of labor in both groups within a 24-hour period. *Secondary Aim:* To look at labor duration, the need for induction of labor, type of delivery, and the use of Oxytocin. **Sample/Setting:** 72 pregnant women were selected for the study. (n=35) in acupuncture group and (n=32) in misoprostol group. Inclusion criteria included: no contraindication for vaginal delivery, had one of the following medical conditions	Study design: Randomized controlled trial. Methods: The electroacupuncture has sterile acupuncture needles inserted and were bilaterally electrostimulated through the needles at two distinct frequencies (5 and 50 Hz) which alternated every 7 pulses and the intensity was increased until the patient could feel it for 30 minutes every 7 hrs. in one to three sessions in a 24-hr. period The misoprostol group was given 25mg of misoprostol intravaginally every 6 hrs. for 24 hrs. Instruments: DIAN series # NS AHI405 pulse generator Bishop score Wilcoxon rank-sum test	There was no statistically significant difference between the two groups in regard to the final Bishop score (AC 7.7 ± 2.2; M 6.4 ± 2.7; p=0.201). There was also no difference in Bishop score progression (AC 4.6 ± 2.4; M 3.4 ± 2.8; p=0.095. Labor was induced in 74% in AC group ad 53% in M group with no significant difference (p=0.282). There was a significant difference when it came to labor duration (AC 404 ± 201 min; M 279 ± 161 min; p=0.0362). Normal deliveries accounted for (AC 22, M 10), forceps were used (AC 2, M 1), and cesarean deliveries occurred in (AC 11, M 21) making this a significant difference between the groups (p=0.106). There was no significant difference in	**Strengths:** -compared their intervention to the standard treatment for ripening the cervix (misoprostol) **Limitations:** -small study sample

(post-term, PROM, normal-term pregnancy with mild or moderate arterial hypertension, normal-term pregnancy with controlled diabetes), Bishop score <7, single infant in cephalic position, a gestational age confirmed in first trimester, reactive NST, and amniotic fluid and EFW within normal ranges for gestational age. The study took place at Maternidade Escola, Brazil between January 2007 and February 2009. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality		the use of Oxytocin between the groups (AC 37%, M 22%, p=0.172). **Conclusion:** Although duration of labor was longer in the electroacupuncture group, there was no clinical significance. Electroacupuncture can be an effective nonpharmacological intervention for cervical ripening.	
Author Recommendations: Recreate study with a larger sample size.			
Implications: Both electroacupuncture and misoprostol can achieve the same results. This nonpharmacological intervention can be successfully used as an alternative to cervical ripening for those patients who wish no to chance the adverse effects of misoprostol. It is well tolerated by the patients.			

Source: Modlock, J., Nielson, B. B., & Uldbjerg, N. (2010). Acupuncture for the induction of labour: a double-blind randomized controlled study. *International Journal of Obstetrics and Gynaecology, 117*, 1255-1261. doi: 10.1111/j.1471-0528.2010.02647.x			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine the effectiveness of acupuncture on inducing labor in post-term pregnancies. *Secondary Aim:* Determine if cervical dilation was enough for amniotomy, cervical length and dilation, length of labor, time from randomization to start of active labor, postpartum bleeding, use of epidural, augmentation of contractions, and instrumental delivery. **Sample/Setting:** 125 healthy pregnant women at 41.6 weeks gestation were included in the study. 95 women were from Aarhus University	Study design: Double-blind multicenter randomized controlled trial. Methods: The acupuncture points used were BL67, LI4, SP6, and GV20 for both groups and the needles appeared to be the same. The acupuncture groups intervention started at 8am where thin acupuncture seirin B-type needles penetrated the skin in the above-mentioned acupuncture points for 30 minutes. The needle points were stimulated with manual twirling every 10 minutes. The acupuncture sham groups interventions occurred in the same way with Park-sham acupuncture needles that had a blunt point and retracted back into the needle handle. The needles were concealed with sticky tubes so neither group	No significant difference was found between the two groups on the number of women who went into active labor or delivered within the first 24 hrs. (acupuncture group 12%, control group 14%, p=0.79). There was also no significant difference between the two groups in cervical length (acupuncture group 51%, control group 65%, p=0.17), cervical dilation (acupuncture group 1.5, control group 1.1, p=0.90), possible amniotomy (acupuncture group 27%, control group 33%, p=0.55), epidural (acupuncture group 40%, control group 42%, p=0.85), length of labor (acupuncture group 448, control group 403,p=0.38), postpartum bleeding (acupuncture group 25%, control group 24%,p=1.00), stimulation of contractions	**Strengths:** -international standards of blinding were adhered to -there was allocation concealment **Limitations:** -violations of the protocol -sham acupuncture could have an effect on pain and may not be the best placebo

Hospital, Denmark and 30 women were from the Herning Regional Hospital, Denmark. Those that did not speak or understand the Danish language, had a multiple pregnancy, PROM or contractions 4-5 minutes apart, and had a previous c-section was not included in the study. (n=62) in the acupuncture group and (n=63) in the sham acupuncture group. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality	knew which they were receiving. Treatment occurred again at 2:30pm if the endpoint had not yet been met. Outcomes were evaluated after 24 hrs. from the start of the intervention. Instruments: Seirin B-type acupuncture needles Park-sham acupuncture needles Provider evaluations Telephone interview to assess after the intervention if the women knew which treatment she was getting.	(acupuncture group 55%, control group 56%, p=1.00), or instrumental delivery (no delivery) (acupuncture group 68%, control group 67%, p=0.78). **Conclusion:** There was no effect of acupuncture on the induction of labor in the post-term patients.	
Author Recommendations: No recommendations were offered.			
Implications: Acupuncture is not an effective nonpharmacological intervention in induction of post-term women.			

Source: Asadi, N., Maharlouei, N., Khalili, A., Darabi, Y., Davoodi, S., Shahraki, H. R., Hadianfard, M., Jokar, A., Vafaei, H., & Kasraeian, M. (2015). Effects of LI-4 and SP-6 acupuncture on labor pain, cortisol level and duration of labor. *Journal of Acupuncture and Meridian Studies, 8*(5), 249-254. doi: 10.1016/j.jams.2015.08.003			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine the effectiveness of acupuncture on labor pain, serum cortisol level, and duration of labor. **Sample/Setting:** 63 healthy term nulliparous singleton pregnant women who spoke Farsi, who were in the active phase of labor, with no fetal growth restriction or anomaly, and who did not want an epidural were included in the study. (n=32) in the acupuncture group and (n=31) in the control group. The study took place between October 2011 and October 2012 at Hafez and Hazrat-e-Zeinab hospitals, Iran. **Johns Hopkins Evidence**	Study design: Randomized single-blind controlled trial Methods: The acupuncture group received acupuncture at LI-4 and SP-6 for 20 minutes. The needles were manipulated until the patient felt De-Qi sensation and then was rotated clockwise every 5 minutes. The control group received sham acupuncture with superficial contact needles in the same way as the acupuncture group except the needles were shaken instead of rotated. Pain was assessed before the intervention, during the intervention, and after the intervention. Before the intervention and 1 hr post intervention blood samples were drawn to measure serum cortisol levels. Length of active phase was the time between 4cm and full dilation and second stage was	Initial pain scores were not significantly different between the groups (acupuncture group 7.6, control group 7.3, p=0.470). There was also not a significant difference in pain reduction between the two groups (acupuncture: 2.38; control: 2.50, p=0.850). There was not a significant difference between the groups when looking at the change of serum cortisol levels (acupuncture group 26, control group 29, p=0.939). There was a statistically significant difference in mean duration of labor (acupuncture: 162 minutes; control: 280 minutes; p<0.001). The same results were found in 2nd stage of labor (acupuncture: 130, control: 250, p<0.001). **Conclusion:** Acupuncture is not	**Strengths:** -RCT -looked at only nulliparous women -blinded study **Limitations:** -small study sample -only nulliparous women were included in the study -only the women who entered active phase of labor between 6pm and 10 pm were included into the study -external validity is not high

Appraisal: **Strength:** Level I **Quality:** Good quality	from full dilation to delivery of the newborn. Instruments: Visual Analog Scale (VAS) (0-10) Centrifuge	effective in managing labor pain or reducing serum cortisol levels, however, it is effective in reducing the length of labor.	
Author Recommendations: To recreate the study with a larger sample size as well as look at other techniques applied to different points of the body to see its effectiveness on labor pain.			
Implications: Acupuncture at LI-4 and SP-6 is an effective nonpharmacological intervention for reducing length of labor. Due to the decreases in duration of labor this could also decrease fetal and maternal complications related to long labors.			

Source: Dong, C., Hu, L., Liang, F., & Zhang, S. (2015). Effects of electro-acupuncture on labor pain management. *Archive of Gynecology and Obstetrics, 291*(3), 531-536. doi: 10.1007/s00404-014-3427-x			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To determine the effectiveness of electro-acupuncture on labor pain management. *Secondary Aim:* To compare the duration of active phase, duration of 2nd stage, duration of 3rd stage, use of oxytocin, birth weight, and APGAR scores. **Sample/Setting:** 180 healthy nulliparous term pregnant women aged 20-35 with a singleton vertex pregnancy at >/=3 cm dilation who was planning on a vaginal delivery with no pregnancy complications and who has never used electro-acupuncture for pain relief was included into the study. (n=60) in the EX-B2 group,	Study design: Randomized Controlled Trial. Methods: The EX-B2 group had two electrodes attached bilaterally to the EX-B2 acupoint. The SP6 group had two electrodes attached bilaterally to the SP6 acupoint. The control group received traditional healthcare. Intensity of electro-acupuncture started at 15 mA and was adjusted when requested by the patient. Pain was assessed during the last contraction before the intervention and 30, 60, and 120 minutes after the intervention. Instruments: Visual Analog Scale (VAS) (0-10) HANS-100B, China electro-acupuncture device	Before the start of the intervention there was no significant difference in pain scores between the groups (EX-B2 group: 7.71 ± 1.26, SP6 group: 7.98 ± 1.19, control group 7.80 ± 1.19, $p>0.05$). Both intervention groups had a significant decrease in pain scores at 30 mins when compared to the control group (EX-B2 group: 6.70 ± 1.28, SP6 group: 6.57 ± 1.42, control group: 7.85 ± 1.22, $p<0.01$) but when the intervention groups were compared to each other there was not a significant difference ($p>0.05$). At 60 and 120 mins there was a significant difference between the EX-B2 group and SP6 group on reduction of pain ($p<0.05$) with the EX-B2 groups score being lower. This was also the same when both intervention groups were compared to the control group ($p<0.05$).	**Strengths:** -multiple variables were compared; labor pain, duration of active phase, duration of 2nd stage, duration of 3rd stage, use of oxytocin, birth weight, and APGAR scores -acupuncture was performed by trained midwives **Limitations:** -patients have different thresholds for pain, intensity of contractions could be different, the speed of dilation can vary, the mental and physical status of the women, and cultural factors -small sample size -only looking at 2 different acupoints -the study did not state how long the intervention was given to the patients -difficult to conduct a blinding protocol -there is no objective measurement tool to assess pain

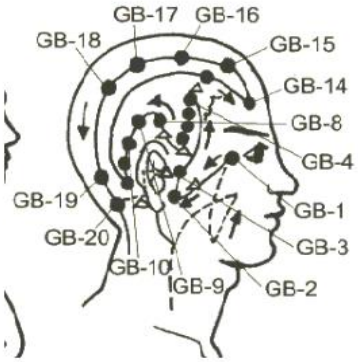
(n=60) in the SP6 group, and (n=60) in the control group. The study took place between October 2012 and September 2013 at the Department of Obstetrics and Gynecology of Sir Run Run Shaw Hospital, China. **Johns Hopkins Evidence Appraisal: Strength:** Level I **Quality:** Good quality		60 min: EX-B2 group: 5.57 ± 1.11, SP6 group: 6.05 ± 1.08, control group: 7.88 ± 1.14 120 min: EX-B2: 6.15 ± 1.18, SP6 group: 6.59 ± 1.09, control group: 8.16 ± 0.95 In the active phase of labor, the time was shorter in the EX-B2 group compared to the SP6 group, however it was not significant ($p>0.05$). There was a significant difference when the intervention groups were compared to the control group (EX-B2 group: 151.47 ± 55.52 min., SP6 group: 163.35 ± 61.96 min., control group: 184.92 ± 46.52 min., $p<0.05$). No significant difference was found between the three groups when it came to length of 2nd stage (EX-B2: 45.78 ± 15.76 min., SP6: 48.80 ± 21.35 min., control: 49.31 ± 18.86 min., $p=0.54$), length of 3rd stage (EX-B2: 9.93 ± 4.13 min., SP6: 10.21 ± 3.91 min., control: 11.08 ± 3.89 min., $p=0.87$), use of oxytocin (EX-B2: 33 (55%), SP6: 32 (53.3%), control 39 (65%), $p=0.38$), birth	

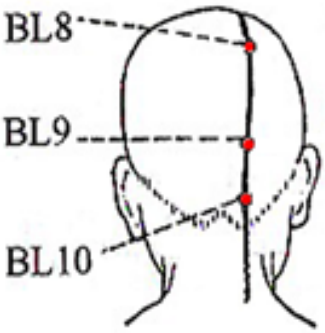
		weight (EX-B2: 3,381.33 ± 309.17, SP6: 3,445 ± 269.60, control: 3,422.50 ± 288.84, p=0.48), and APGAR scores (1 min EX-B2: 9.90 ± 0.30, SP6: 9.93 ± 0.31, control: 9.88 ± 0.37, 5 min EX-B2: 9.99 ± 0.13, SP6: 10.00 ± 0.00, control: 9.97 ± 0.13, p>0.05). **Conclusion:** Acupuncture at EX-B2 and SP6 points are effective at reducing pain and reducing the length of the 1st stage of labor. The EX-B2 acupoint has a slightly better analgesic effect which may be due to the fact that this point is traditionally used for labor pain relief.	
Author Recommendations: To recreate the study with a larger sample size.			
Implications: Acupuncture to points EX-B2 and SP6 can be an effective nonpharmacological intervention for decreasing labor pain and decreasing the length of the 1st stage of labor. It is an easy and safe intervention.			

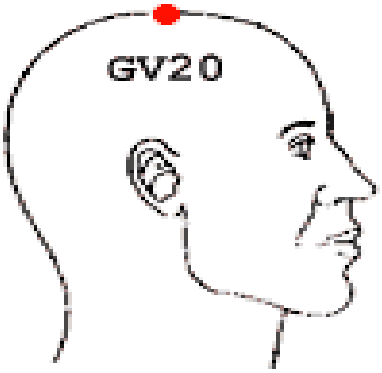
Source: Smith, C. A., Crowther, C. A., Collins, C. T., & Coyle, M. E. (2008). Acupuncture to induce labor. *Obstetrics and Gynecology, 112*(5), 1067-1074. doi: 10.1097/AOG.0b013e31818b46bb			
Purpose/Sample	**Design (Method/Instruments)**	**Results**	**Strengths/Limitations**
Purpose: *Primary Aim:* To look at the effectiveness of acupuncture in inducing labor. *Secondary Aim:* To compare methods of pain relief, mode of birth, and APGAR scores **Sample/Setting:** 364 healthy pregnant women with intact membranes, no active labor, older than 16 years, scheduled for a postterm induction with a singleton pregnancy in a cephalic presentation were included in this study. Study participants were form the Women's and Children's Hospital, South Australia between May 1998 and February 2005. (n=181) in the acupuncture group and (n=183) in the sham acupuncture	Study design: Randomized controlled trial. Methods: The acupuncture group received acupuncture at points Hegu LI4, Sanyinjiao SP6, sacral points Shangliao UB31, and Ciliao UB32, Zhusanli ST 36, Taichong Liv 3. Treatment lasted 30-40 minutes. The sham acupuncture group received acupuncture at non-acupuncture points in the sacral area, hand, foot, below the knee, and the lower leg for the same amount of time as the acupuncture group. Two 45 minutes sessions were given in a two-day period before their planned medical induction. Instruments: Labor Agentry Scale Questionnaire	There was no significant difference between the two groups when it came to induction methods: prostaglandin induction (acupuncture: 85 (47%), sham: 69 (37.7%), p=.11), AROM only (acupuncture: 69 (38.1%), sham: 76 (41.5%), p=.57), oxytocin only (acupuncture: 36 (19.9%), sham: 41 (22.4%), p=.55), AROM plus oxytocin (acupuncture: 29 (22.3%), sham: 35 (27.8%), p=.52), prostaglandin plus AROM and oxytocin (acupuncture: 10 (7.7%), sham: 11 (8.9%), p=.68). There was not a significant difference between the groups when it came to time from intervention to delivery (acupuncture: 68.6 hrs; control group 65 hrs; p=.23), and length of labor (acupuncture: 5.9 hrs; control group 6.5 hrs; p=.5). There was no	**Strengths:** -trained acupuncturists were used -multiple variables were compared; induction, methods of pain relief, mode of birth, and APGAR scores -good sample size -central randomization, blinded evaluation of outcome assessment, credibility assessment, high compliance with study protocol **Limitations:** -uses a select few acupuncture points -acupuncture was only administered twice -acupuncture was only done a short period before induction was to take place

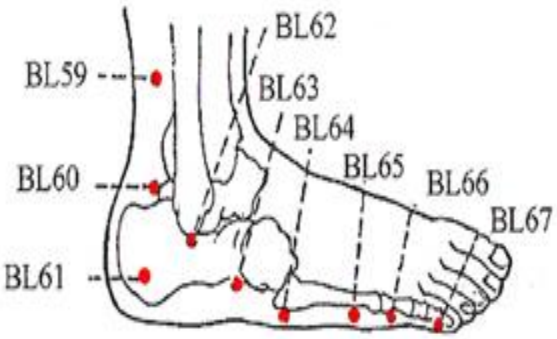
group. **Johns Hopkins Evidence Appraisal:** **Strength:** Level I **Quality:** Good quality		significant difference found between the groups in regard to methods of pain relief, mode of birth, and APGAR scores. **Conclusion:** Acupuncture that was administered 2 days before a scheduled induction was found to not be effective in reducing the need for induction methods or reducing the length of labor for women with postterm pregnancies.	
Author Recommendations: Future studies should be done looking at the effectiveness of different forms of acupuncture. Other studies could benefit from consulting with more experts on acupuncture.			
Implications: When only 2 sessions of manual acupuncture are performed at only two days before a scheduled induction it is not an effective nonpharmacological intervention for decreasing duration of labor or decreasing the need for pharmacological induction methods.			

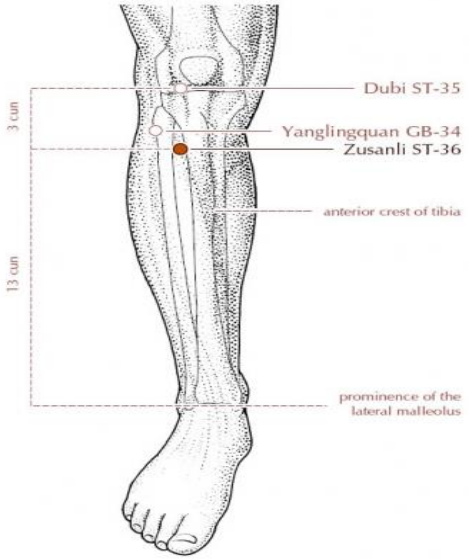
Appendix 2 – Acupressure and Acupuncture Points

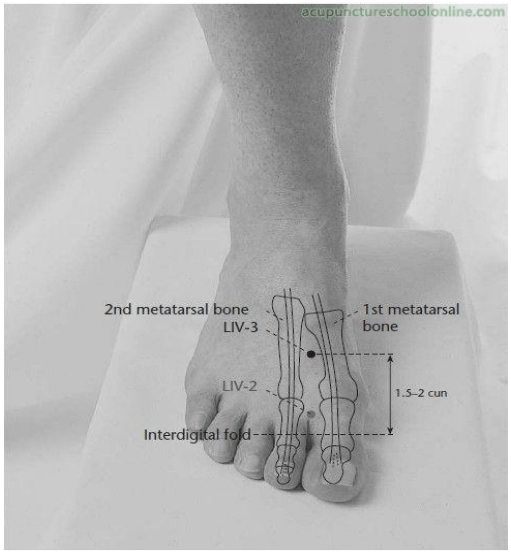


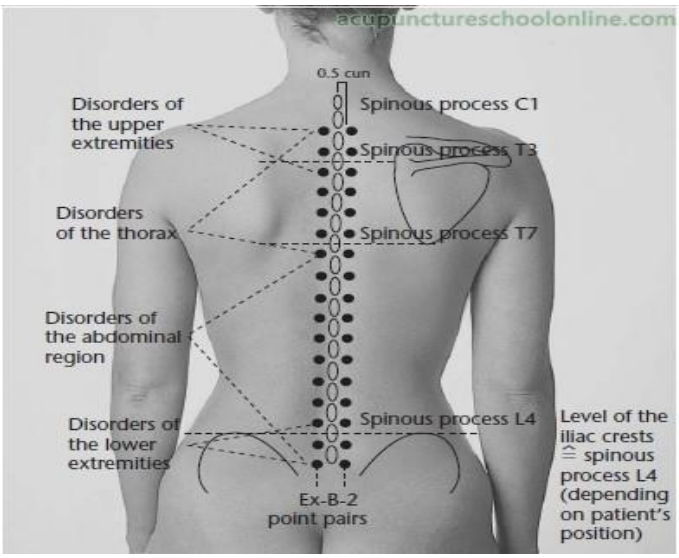


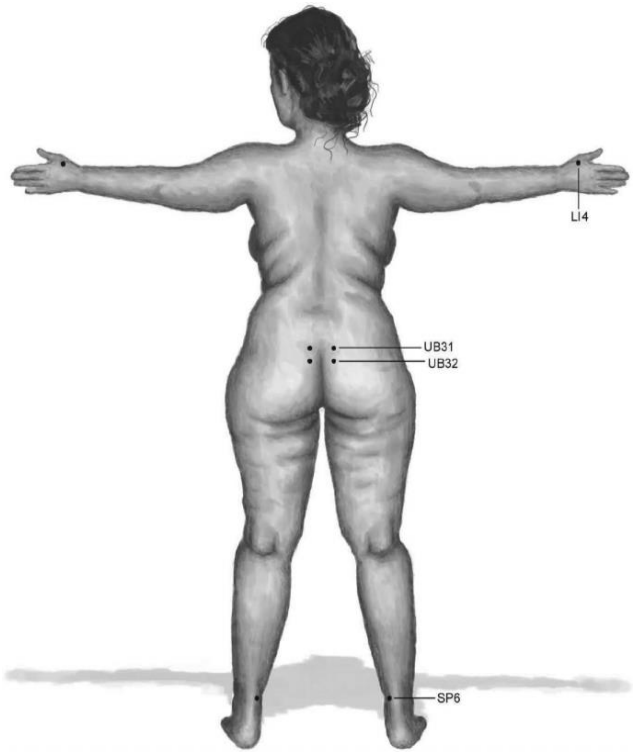


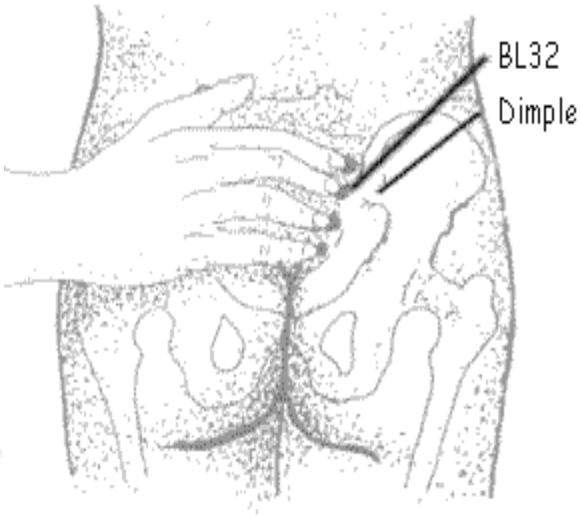





acupunctureschoolonline.com
2nd metatarsal bone
LIV-3
1st metatarsal bone
LIV-2
1.5–2 cun
Interdigital fold


acupunctureschoolonline.com
0.5 cun
Disorders of the upper extremities
Spinous process C1
Spinous process T3
Disorders of the thorax
Spinous process T7
Disorders of the abdominal region
Disorders of the lower extremities
Spinous process L4
Level of the iliac crests ≙ spinous process L4 (depending on patient's position)
Ex-B-2 point pairs


LI4
UB31
UB32
SP6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Dimple