Improving Comfort and Reducing Pain During Labor

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Improving Comfort and Reducing Pain During Labor

A Capstone Submitted to the

University Honors Program

In Partial Fulfillment of the

Requirements of the Baccalaureate Degree

With Honors

Department Of

Health and Human Sciences

By

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DeKalb, Illinois

May 9, 2020
University Honors Program
Capstone Faculty Approval Page

Capstone Title (print or type)
Improving Comfort and Reducing Pain During Labor

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Date of Approval (print or type) ____4/30/2020__________________________

Date and Venue of Presentation URAD Day, April 28-30___________________

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Abstract

The pain that women experience during labor is specific to the individual and differs for each birthing mother. Pain during labor is affected by physiological and psychological factors and the intensity of the pain tends to vary greatly. The purpose of this literature review is to discuss the different pain management techniques available to laboring mothers and the importance of preparedness in childbirth on the effects of improving comfort and reducing pain. This paper consists of literature reviews from within the past five years, focusing on the different methods of pain intervention for childbirth. There are many methods to handling pain during childbirth, and those involved in the process should be well informed on the pharmacological and non-pharmacological interventions available. Having knowledge about each woman's different expectations during labor will allow the healthcare team to better prepare a woman for labor and delivery and help them to steer the woman toward a birthing experience that is right for them. While there have been many studies done to compare the effects of different pain interventions in laboring women, the best technique is still controversial and depends on the woman.
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**Introduction**

Pain during labor is affected by the physiological and psychological factors and the intensity of the pain tends to vary greatly (Khaneshi et al, 2020). Most women in labor may require pain relief, while others may choose to forego any pharmacological interventions for more natural methods. There are many different types of pain management that mothers can use during labor, including pharmacological and non-pharmacological interventions. Non-pharmacological interventions tend to focus more so on helping women cope through the pain of labor, while the focus of pharmacological interventions is to relieve the pain (Jones et al, 2012). There are several different interventions a woman can use during labor than can work separately or in combination to achieve the best outcome for the patient. Among the variety of drugs, analgesia, and non-pharmacological methods introduced to control the pain of labor, there is still a controversy over which method is the most effective at pain management. This paper will discuss and review several different interventions, both pharmacological and non-pharmacological, such as the use of epidurals, analgesics, induction, practicing mindfulness, distraction techniques, and positioning techniques.

**Review of Literature**

Isbir and Topcu (2017), performed a descriptive study to determine the effects of pain and the fear of labor among mothers as well as the use of oxytocin for the induction of labor. The study involved, “52 pregnant women who received oxytocin induction (oxytocin group) and 55 pregnant women that did not receive oxytocin (no oxytocin group)” (Isbir & Topcu, 2017, p. 94). This study also evaluated pain severity and contraction frequency, and fear of labor through use of the Wijma Delivery Expectancy/Experience Questionnaire (Isbir & Topcu, 2017). Labor and
delivery causes women to experience extreme physical pain and mental stress, so it is no wonder that most women have a sense of fear and dread in regard to labor and delivery. This stress surrounding a woman’s fear of labor pain can also result in prolonged labor, and according to the “fear-tension-pain theory of pain management, when women experience fear or stress during labor, their bodies react in a way that increases pain” (Isbir & Topcu, 2017, p. 95). Induction of labor is typically performed when there is prolonged labor, but there are also other medical conditions that may indicate the need for induction. Women that were involved in the induction process gravitated towards a more positive attitude concerning labor and the pain they would experience. On the other hand, the induction of labor through use of oxytocin resulting in “stimulation of the uterus may cause increased discomfort due to contractions and shorter recovery periods between contractions” (Isbir & Topcu, 2017, p. 95).

According to the results from this study, the duration of labor was significantly longer in the oxytocin group. Additionally, the pain severity score and the contraction frequency were higher in the oxytocin group than in the not oxytocin group. This study concluded that the duration of labor was longer, pain and contraction frequency were increased, and the fear of labor score were higher in women receiving oxytocin for induction of labor. Researchers recommend health care workers provide more supportive care to mothers receiving oxytocin in order to reduce fear and perceived pain in labor as well as shorten the length of labor (Isbir & Topcu, 2017). Another recommendation involved providing non-pharmacological pain management, such as breathing, relaxation, changing positions, and acupressure. These methods can provide women with physical support and comfort, thus reducing fear while helping them cope through the pain. This study showed that induction of labor with oxytocin can prolong the duration of labor while increase pain and contractions frequency, therefore it is important to
continuous supportive care to help reduce the side-effects of oxytocin induction. The more knowledgeable a mother is regarding the processes of labor can result in less fear regarding labor and pain, which may help to relieve fear-induced pain during inductions.

Khaneshi et al. (2019), conducted a study to examine the effects of continuous epidural infusion of bupivacaine and fentanyl compared to the use of patient controlled analgesia during labor (Khaneshi et al, 2019). Within the study, there were 60 pregnant women involved in this study, with the first group received the controlled infusion (CI), while the second group received the patient-controlled analgesia (PCA) (Khaneshi et al, 2019). All women were given an initial dose of 125 mg bupivacaine alongside 3 mg/ml of fentanyl. Those in the CI group were then continuously administered the same initial infusion of 8 ml/hr. While those in the PCA group were then administered 10 ml of a bolus dose of 125 mg bupivacaine that was combined with 2 ml of fentanyl via an epidural catheter (Khaneshi et al, 2019). To examine the pain relief effects in both groups the Visual Analogue Scale (VAS) was assessed 20 minutes after drug administration, asking the mothers to rate their pain level from 1-10.

Results from the study show that the mean duration of labor at the second stage were 114±26.98 minutes and 73.33 ±13.97 minutes in PCA and CI groups (Khaneshi et al, 2019). This showed that in CI groups there was a significantly lower duration at the second stage. When measuring each mothers pain level using the VAS, pain intensity was also compared before analgesia administration in order to prevent any bias. At baseline, the median pain level for the PCA group was a six, with the CI group baseline being a 5.5. The VAS was then assessed once every hour, with the PCA group resulting in pain levels rated from 0-4 at the first hour through the third hour, with a rating of 0-3 at the fourth hour, and a rating of 0 pain at the fifth and final hour of assessment. On the other hand, the CI group rated their pain from 0-3 at the first hour,
with ratings of 0-4 during the second through fourth hours and a final rating of 0 pain at the fifth and final hour. While pain intensity did decrease in both groups, according to Khaneshi et al. (2019), “[PCA] group had more severe alteration rather than [CI] group, which reveals higher efficacy of CI analgesia technique” (p. 45).

In terms of benefits, PCA offers a unique method as it provides more effective pain relief, while also allowing the patient the ability to self-administer a bolus of the medication every so often when they feel more pain coverage is needed (Khaneshi et al, 2019). PCA also provides “more efficient analgesia, reduction in dose of administered local anesthetics, decreased rate of adverse events, and reduced lower extremity motor block” (Khaneshi et al, 2019, p. 43). Researchers suggest that in the future there must be a standardized tool of measurement when it comes to addressing pain relief from PCA. The results from this study showed that PCA led to prolonged duration of labor during the second stage versus the CI group. According to Khaneshi et al. (2019), “…[PCA] technique does not provide better pain control and patients satisfaction compared to CI analgesia technique and increases the dosage of administered analgesic” (p. 47).

Jones et al. (2012), summarized 15 different systematic reviews on the effectiveness of pharmacological and non-pharmacological pain relief methods used during labor (Jones et al, 2012.) Studies suggest that, “epidural, combined spinal epidural (CSE) and inhaled analgesia effectively manage pain in labor, but may give rise to adverse effects” (Jones et al, 2012, p. 2). Women who chose to receive epidural analgesia were more likely to require instrumental vaginal births and caesarean sections due to fetal distress, experience hypotension, fever or urinary retention, and motor blockade. In women who chose to receive combined spinal epidural (CSE), they observed less urinary retention, although they did experience pruritus more than women that chose low-dose epidurals (Jones et al, 2012). This study also looked at non-pharmacological
interventions to help mothers cope with pain such as water immersion therapy, relaxation, acupuncture, and massage therapy.

The evidence from these single trials suggested that these non-pharmacologic interventions helped women to cope through the pain while also improving pain relief satisfaction of women’s childbirth experience. When relaxation was used as a coping mechanism through labor pains, women experienced fewer assisted vaginal births, while acupuncture resulted in fewer assisted vaginal deliveries and caesarean sections (Jones et al, 2012). Unfortunately, there is limited high quality evidence to support the efficacy of non-pharmacological pain management, although non-pharmacological methods are non-invasive and are safer for mother and baby. There is more evidence to support pharmacological pain management over non-pharmacological methods, but these methods seem to have an increased risk of adverse effects during labor and delivery (Jones et al, 2012). Epidural analgesia does provide mothers with a complete relief of pain, while still allowing them to feel the pressure of labor, although there is an increased risk of assisted instrumental vaginal delivery (Jones et al, 2012). Researchers recommend tailoring these methods to each woman’s wishes, needs, and circumstances.

Vallejo and Zakowski (2019), discuss in an evidence-based review the clinical uses, advantages, and disadvantages of nitrous oxide use for pain relief during labor. Among the different types of labor analgesics used, nitrous oxide is one of the most common. Nitrous oxide is a type of inhaled analgesic that can be self-administered and delivers 50% nitrous oxide/50% oxygen (Vallejo & Zakowski, 2019). This type of analgesic can be started or stopped at any time, which allows for the option of switching to another method of pain management if needed. Nitrous oxide provides pain relief at a level similar to that of an epidural but does not result in
any of the unwanted side effects. According to Vallejo & Zakowski (2019), “[nitrous oxide] can also create a sense of pleasure, relaxation, and anxiety relief, allowing the parturient to not care as much about her pain” (p. 2). Once inhalation administration begins pain relief starts to take affect within minutes while also leaving the mother’s system a few minutes after self-administration ends. This allows the mother the ability to freely move and walk around, unlike with epidurals where mothers would be bed bound for several hours. Because this type of analgesic is self-administered, the mother has the ability to control when she wants to put the mask on and when she wants to take it off. Since nitrous oxide is an inhaled analgesic that must be self-administered, it forces the mother to “focus on breathing which may help to explain some of its beneficial effects” (Vallejo & Zakowski, 2019, p. 2). Nitrous oxide is very versatile when it comes to usage during labor and delivery, as it can be administered during all three stages of labor, as well as after delivery if the mother were to need a repair to a laceration or episiotomy.

While nitrous oxide has been used safely for laboring mothers and is a great alternative to analgesia in all stages of labor, research shows that some women may not receive effective pain relief from it. Nitrous oxide is a great noninvasive and painless alternative for women who do not wish to receive a spinal epidural, and according to Vallejo & Zakowski (2019), it is “safe for the parturient and the fetus according to clinical evidence” (p. 9). Research suggest that if used, that the exposure time should be limited to less than 3-4 hours.

Baez-Suarez et al. (2018), conducted a randomized study to examine the effectiveness of transcutaneous nerve stimulation (TENS) for pain relief during labor. This study was conducted by randomly assigning 63 pregnant women to three groups, “active TENS 1 (n = 21), active TENS 2 (n = 21), or TENS placebo (n = 21)” (Baez-Suarez et al, 2018, P. 3). Using the gait control theory of pain, “the effectiveness of TENS depends on the duration, frequency, and
amplitude of the stimulating current and the location of the electrode’s application” (Baez-Suarez et al, 2018, P. 2). All three groups were hooked up to the TENS device, but only the women in the 2 active TENS groups were given TENS at a frequency of 80 to 100 Hz during their labor, while the placebo group received no TENS whatsoever. The electrodes were placed along the spinal cord at T10 through L1 and S2 through S4 levels in order to better stimulate the nerve roots (Baez-Suarez et al, 2018). Pain levels were assessed at baseline and after 10 and 30 minutes by use of the VAS, to evaluate the effectiveness of TENS.

Results from this study showed that TENS is an effective non-pharmacologic method for reducing pain in laboring mothers. The baseline pain VAS of the groups was 7.0±1.5 in TENS 1, 8.1±1.2 in TENS 2, and 6.6±1.7 in TENS placebo. The VAS of pain at the 10-minute mark were 6.2±1.4 in TENS 1, 6.2±2.0 in TENS 2, and 8.3±1.2 in TENS placebo. The final VAS of pain was at the 30-minute mark and the results were 6.3±1.7 in TENS 1, 5.9±1.9 in TENS 2, and 8.8±1.1 in TENS placebo. These results show that there was in fact a reduction in pain in the active TENS groups compared to the placebo group, and there was clinical significance in the pain reduction for the TENS 2 group. According to Baez-Suarez et al. (2018), “with the use of high frequencies modified in time (80-100 Hz) as well as a high pulse width (350 us), results showed a clinically and statistically significant difference” (p. 9). Additionally, “the greatest degree of pain reduction occurs when the electrodes are placed within the receptive field for the nerve roots to alter nociceptive transmission in the dorsal horn of the spinal cord” (Baez-Suarez et al, 2018, p. 6). Researchers suggest that although TENS resulted in reduced pain, there are also other factors that influence pain during childbirth, such as patient anxiety and knowledge on the birthing process.
Bonura (2018) reviewed research evidence demonstrating how practicing mindfulness during labor can result in improved pain management, coping, and comfort measures. According to Bonura (2018), “mindfulness-based training programs offer awareness of the ever-changing nature of physical sensations, and separation between the physical experience of the body (i.e., pain) and the emotional and mental experience.” Through mindfulness, women can achieve a sense of emotional control and the ability to manage and tolerate painful experiences. This tool is very useful to laboring mothers, as it is non-pharmacological and non-invasive, thus there are no adverse effects.

Not only is mindfulness a great way to achieve mental clarity and control, but yoga is also beneficial to pregnant mothers in the months leading up to labor. Yoga can lead to decreased stress, improved quality of life, as well as labor comfort, pain, and duration (Bonura, 2018). Pain is subjective and varies for every woman based on psychosocial cognitive, and physiological factors, and anxiety regarding labor results in a reduced ability to manage pain. Yet in women that practiced yoga or mindfulness, there was an increased sense of confidence, self-efficacy, and coping abilities which all played a role in the improvement of a woman’s ability to manage labor pain. These attitudes that women gain from practicing mindfulness also have positive effects on women during labor, such as decreased anxiety and increased confidence in their ability to make it through labor and delivery. Women that practiced yoga leading up to their labor experienced significantly less labor pain, shorter duration of labor, and a lower risk of cesarean section. One of the benefits of using yoga and mindfulness as a way to cope during labor is that it results in reduces use of analgesics during labor, due to the mother’s being able to rely on her mind and ability to overcome any emotions of fear related to pain.
Bonura (2018) suggests that in the months leading up to labor, women practice mindfulness through yoga particularly involving physical exercise, breathing practice, meditation and mental training, and deep relaxation. These combined practices result in improved physical strength, greater relaxation of the mind and body, improved ability to calm oneself, as well as improved self-awareness. These physical and psychological effects of yoga lead to a reduction in labor pain as well as improved maternal comfort. Bonura suggests that pregnant women receive mindfulness training via an extended training program, as well as regular childbirth education programs to increase their knowledge in what to expect during labor. When mindfulness and yoga are combined, they offer women a holistic and personalized approach to support them as they cope with labor pains.

Amiri et al. (2019), conducted a randomized controlled clinical trial evaluating the effects of distraction techniques on pain and stress during labor. This trial involved 68 women that were randomly assigned to two groups, the intervention group and the control group, with the women in the intervention group receiving distraction techniques. The VAS was used each hour during labor to assess each woman’s pain level, while data was also collected to determine both groups mean length of each stage of delivery. For those in the intervention group, counseling based on distraction techniques for controlling stress, fear, and pain was presented in four different sessions within a week starting during each woman’s 32nd week of pregnancy. Throughout these sessions, several distraction techniques were taught to the women, including “watching movies, solving table and puzzles, listening to music, illustrating child’s future, remembering memory, talking about their skills, reverse counting the numbers, counting the serum drops used during labor, and also about personal interests and experiences” (Amiri et al, 2019, p. 3). In the final session, the women were educated on the different stages of labor, delivery progress, childbirth
preparation, and ways to control stress and fear through use of distraction techniques. For those in the control group, distraction techniques were not provided, although they were educated on the signs of delivery, the different stages, and when the appropriate time is to go to the hospital.

The primary outcomes of this study included severity of labor pain and perceived stress, with the secondary outcomes involving fear of childbirth and the total length of delivery. Results from the study showed that at the active stage of labor, “the perceived stress score was 11.8 (5.7) and 15.2 (7.1) in the intervention and control groups, respectively” (Amiri et al, 2019, p. 4).

Before interventions were provided to the intervention group, there was no statistical difference between the two groups regarding stress, but once provided, the distraction technique group had a mean score of perceived stress that was significantly less than that of the control group. In regard to pain severity, the intervention group had a mean pain rating of 6.2, while the control group had a mean pain rating of 7.5. When it came down to fear of childbirth, the mean score was 29.1 in the intervention group and 39.1 in the control group. For those involved in the intervention group, the mean total length of delivery was 247.5 minutes compared to 296.9 minutes for the control group.

Results from this study show that use of distraction techniques used during labor resulted in reduction of pain and stress. Distraction techniques are a useful, non-invasive, and simple method that can be used to reduce the stress and pain of labor. Amiri et al. (2019) stated, “one of the limitations of this research is that it was conducted only on women with first and second pregnancies, therefore, the results cannot be generalized to women with third or higher pregnancies” (p. 8). In the future, researchers suggest more studies must be conducted on the use of distraction technique during labor to reach a decisive conclusion on their effectiveness (Amiri et al, 2019).
Berta et al. (2019), summarized several different articles discussing the maternal birthing positions effects on pain and duration of labor. According to Berta et al. (2019), “giving birth in an upright position can benefit the mother and baby for several physiologic reasons” (p. 1). One benefit involves helping the uterus to contract more strongly as well as allowing the baby to get into a better position, which will help relieve discomfort during the delivery. Getting the fetus into the right position for delivery is very important as it facilitates the rotation and descent of the baby’s head, thus reducing pain and duration of labor. Of the many different birthing positions, “flexible sacrum positions (FSP = knee-standing, on all fours, sitting on a birth seat and lateral) is where weight is taken off the sacrum,” which allows the mothers pelvic outlet to expend well enough for delivery (Berta et al, 2019, p. 2). Other positions that may help relieve pain while also shortening the duration of labor include sitting, standing, and squatting. Allowing mothers, the option to choose which position they want to be in helps them to become more relaxed and feel comfortable.

Results showed that positioning the mother into the flexible sacrum position can reduce the duration of the second stage of labor by 21 minutes (Berta et al, 2019). This reduction in time was due to use of three positions: use of birthing ball, flexible sacrum and squatting positions (Berta et al, 2019). According to Berta et al. (2019), “the reduction in second stage duration have greater advantages for both the mother and her infant by decreasing unnecessary intervention for the mother and reduced fetal heart rate abnormality, neonatal hypoxia and acidosis” (p. 7). Changing positions during labor can help the baby to turn into better positions that can help relieve pressure off the mother, thus reducing pain as well. Researchers suggest offering the use of several different positions to laboring mothers, while keeping in mind their comfortability, as
well as their ability to tolerate certain positions. The use of certain position changes also depends on the current positioning of the fetus.

Schmuke (2017), discusses the use of water immersion therapy during labor as a method that is beneficial for pain relief. Water immersion, or hydrotherapy, is a non-pharmacologic method of pain relief used during the first stage of labor that involves submersion of the body up to the chest in warm water. According to Schmuke (2017), “women who used water immersion during labor were less likely to be transferred to an obstetrical unit for epidurals or other methods of pain relief…” (p. 17). Additionally, women that participate in immersion therapy are also less likely to undergo cesarean delivery. The birthing process can also be positively impacted by water immersion, as it aids in the reduction of anxiety and pain perception, as well as encourages the mother to maintain an upright position, which can help to facilitate and ease the progression of labor (Schmuke, 2017). Other benefits women experience from this type of pain intervention include: less symptoms of stress urinary incontinence, increased perfusion to the uterus, increased buoyancy and extremity support, increased mobility, decreased third- and fourth-degree perineal lacerations, and improved contraction effectiveness (Schmuke, 2017).

Result from this summary suggest that the use of water immersion for pain relief during labor is increasing, and that it can also reduce the use of analgesia as well as the duration of labor. According to Schmuke (2017), “water immersion appears to be a safe and viable option for women seeking alternative methods of comfort during labor in order to increase maternal satisfaction with the birth experience” (p. 18). Schmuke suggests that although several researchers have conducted studies proving the effectiveness of immersion therapy, more research is needed in the future to assess the all the potential outcomes surrounding this type of therapy. Additionally, Schmuke encourages healthcare workers involved with the childbirth
process to educate themselves on the benefits of immersion therapy, so that more women can experience this non-invasive method of pain relief.

Bala et al. (2017), conducted a study to evaluate massage therapy versus ambulation on the effectiveness of pain relief during labor. Providing at least 30 minutes of massage therapy along the bottom of the feet and the mothers back, in a circular motion, shows a significant reduction in pain (Bala et al, 2017). Massage therapy is a non-invasive, cost-effective way to provide mothers with non-pharmacologic pain relief. Bala et al. (2017) also stated that “labour pain is the result of a complex and subjective interaction of multiple physiologic and psychological factors on a woman’s individual interpretation of labour stimuli” (p. 29). This intervention can result in significant reduction of anxiety when mothers were given massages throughout the labor process (Bala et al, 2017).

Additionally, use of ambulation during the first stage of labor is shown to be effective in decreasing the duration and intensity of pain during labor. Keeping the mother active during the first stage of labor, rather than resting in bed, can prevent the compression of the inferior vena cava, promote descent of the fetus into the birth canal, as well as facilitate the relaxation of the pelvic muscles (Bala et al, 2017).

According to Bala et al. (2017), “Tension, anxiety and fear are factors contributing towards women’s [ereception of pain and may also affect their labour and birth experience” (p. 28). Both ambulation and massage therapy offer mothers a form of distraction during labor that also provides effective relief of tension and pain and can have a positive effect on their experience. Results from this study show that the use of massage therapy and ambulation are effective methods of pain relief, as well as anxiety (Bala et al., 2017). Bala et al. (2017) stated,
“back massage and ambulation can be used as a non-pharmacological intervention and recommended as a pain relief measure during first stage of labour” (p. 32).

**Conclusion**

Pain that women encounter during labor is an individual experience that differs from person to person. The physiologic and psychologic process of labor may be associated with intense pain and stress, but with proper interventions the amount of pain each mother experiences can be reduced and managed at a more tolerable level. While there have been many studies done to compare the effects of different analgesia in laboring women, the best technique is still up for debate, “as pain is a highly individualized, personal experience, women may require an assortment of methods to control pain” (Shmuke, 2017, p. 16). The aim of administering analgesia during labor is to provide women with an adequate amount while also allowing for the least maternal and fetal complications. Teaching laboring mothers about the different options available for pain management, both pharmacological and non-pharmacological, was also emphasized by the studies discussed previously. According to Baez-Suarez et al. (2018),

Neuraxial analgesia during labour is the most effective method for pain relief, but it appears to be associated with certain side effects, such as maternal hypotension, decreased uteroplacental perfusion, foetal bradycardia, maternal fever and pruritus, an increased oxytocin requirement, a prolonged second stage of labor, a higher rate of cesarean deliveries, and especially, higher costs (p. 2).

While this method of pain relief may be effective, the potential complications may prevent some women from choosing this intervention during labor. This is why it is important for women and obstetric healthcare workers to be well educated on non-pharmacologic methods as well, so that
we can provide laboring mothers with other options that are just as effective as well as safer. Additionally, women’s satisfaction in regard to their labor experience can be more positively affected by the use of non-pharmacologic methods (Baez-Suarez et al, 2018). There are many methods to handling pain during childbirth, and those involved in the process should be well informed on the pharmacological and non-pharmacologic interventions available. Having knowledge about each woman’s different expectations during labor will allow the healthcare team to better prepare a woman for labor and delivery and help them to steer the woman toward a birthing experience that is right for them.
References


