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Spring 2021


## Non-Pharmacological Pain Management in Labor: A Systematic Review

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Young, Angela; Shipe, Madison; and Smith, Madeline, "Non-Pharmacological Pain Management in Labor: A Systematic Review" (2021). *Williams Honors College, Honors Research Projects*. 1257. [https://ideaexchange.uakron.edu/honors\\_research\\_projects/1257](https://ideaexchange.uakron.edu/honors_research_projects/1257)

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Non-Pharmacological Interventions on Labor Pain: A Systematic Review

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### **Abstract**

During childbirth, women experience labor pain throughout the three stages of labor. The first stage is where the contractions start and end which creates the need for a form of pain management. Various techniques are used to manage first stage labor pains. The use of non-pharmacological methods is becoming more prevalent because natural births are becoming more popular and pharmacological interventions have side effects and drug interactions. The purpose of this paper is to conduct a systematic review of the literature comparing non-pharmacological pain management methods in women during the first stage of labor. This will answer the PICOT question: In women during the first stage of labor, how do the non-pharmacological interventions of hydrotherapy, therapeutic touch, and the use of the birthing ball, compared to the standard treatment, affect pain management. Search methods include use of keywords in databases: CINAHL plus with full text, MEDLINE with full text, and SocINDEX with full text. Twenty research articles are used to describe hydrotherapy, birthing ball use and therapeutic touch as pain management methods in labor. Based on a critical appraisal of the evidence, recommendations for future practice will be created.

During childbirth, women experience labor pain throughout the multiple stages of labor. The first stage is the longest stage of labor, beginning at the time of the labor onset and cervical dilation and ending when the cervix is fully dilated to 10 cm (Durham & Chapman, 2019). The second stage starts when the cervix is fully dilated, and the laboring woman feels the urge to bear down and starts to push and ends after the delivery of the newborn and the placenta (Durham & Chapman, 2019). The third stage of labor is where the mother delivers the placenta, and the fourth stage is within the first four weeks postpartum (Durham & Chapman, 2019). Effective pain management is a challenge during the first stage of labor and affects many women that give birth every year. According to (Martin et al., 2019), 3,791,712 women gave birth in the United States in 2018. This shows that a large number of women experience labor and the pain associated with it every year.

Non-effective pain management during the first stage may lead to negative maternal and neonatal outcomes such as stress, anxiety, ineffective pushing, increased risk for vacuum, forceps or cesarean birth, lower Apgar scores, and ineffective coping mechanisms (Durham & Chapman, 2019). Non-pharmacological interventions are necessary in the event that pharmacological methods do not work, there are pharmacological contraindications, or it is the women's preference for an all-natural childbirth (Durham & Chapman, 2019). There are a variety of non-pharmacological interventions that can be implemented to decrease labor pain. This project will focus on three non-pharmacological methods that may be used to help effectively manage and help women cope with first stage labor pain. They are hydrotherapy, therapeutic touch and the birthing ball. These were chosen because the use of hydrotherapy, therapeutic touch, and birthing balls are becoming more popular and are even a standard of care

in some hospitals (Durham & Chapman, 2019). The purpose of this systematic review of the literature is to describe and critically appraise the literature examining the effect of non-pharmacological pain management methods in the first stage of labor and to advance practice recommendations based on a synthesis of evidence. This review will answer the PICOT question: In women during the first stage of labor, how do the non-pharmacological interventions of hydrotherapy, therapeutic touch, and the use of the birthing ball, compare to the standard treatment, affect pain management. This is significant because the scope and standard of nursing care is providing adequate pain control for patients. According to Wells et. al., (2008), “Inadequately managed pain can lead to adverse physical and psychological patient outcomes for individual patients and their families.” (para. 3) The same literature also stated “Continuous, unrelieved pain also affects the psychological state of the patient and family members. Common psychological responses to pain include anxiety and depression (Wells et. al., 2008, para 4). Since the labor process is painful, it is important that nurses implement the proper interventions needed in order to decrease pain in their laboring moms.

### **Methods**

Search inclusion criteria for relevant research publications included: samples of women specifically in the first stage of childbirth labor and one of the three non-pharmacological interventions: hydrotherapy, therapeutic touch, or the birthing ball/peanut ball. Additional inclusion criteria included peer-reviewed publications, primary sources, and publications made within the last five years. Databases included CINAHL plus with full text, MEDLINE with full text, and SocINDEX with full text. Key search terms included labor pain, management, hydrotherapy, therapeutic touch, peanut ball and birthing ball. To screen publications, abstracts were read and those specifying another stage of labor were excluded. All other publications,

regardless of findings, were considered for use in the systematic review to decrease bias. Although the publication date range was initially narrowed to be within the past five years, some of the chosen articles are outside this range. We chose to select articles outside the year range of 2015-2020, because there was a lack of research to perform an adequate critical appraisal. To make sure that the search was comprehensive, if the abstract had relevance to the specific PICOT question, it was viewed to help decide whether or not it met the appropriate inclusion criteria. In order to ensure the quality of the literature chosen, a table of evidence matrix was used in order to evaluate the literature and is included within this paper (see Appendix B). To decrease bias, all relevant articles that fit the selection criteria were reviewed by the project team. The specific numbers of articles that were found and were excluded from research are included in a PRISMA flowchart (see Appendix A).

### **Integrated Review of the Literature**

There was an abundance of information to be learned about hydrotherapy, therapeutic touch, and the use of the birthing ball. The chosen studies all presented information in many different ways, but overall had similar findings. Across the selected studies about hydrotherapy in labor there were many different types of studies such as quasi-experimental designs, descriptive designs, and randomized controlled trials. Most of the evidence generated a level of evidence of two or three while the one descriptive study generated a level of evidence of six. As for the use of the peanut ball, the literature was mainly randomized controlled trials and quasi-experimental studies. These generated levels of evidence of 2 and 3. As for therapeutic touch, all of the studies were randomized controlled trials. This categorized them all as a level of evidence of 2. All studies were conducted in labor and delivery units or in obstetrical clinics. They were conducted in a wide range of countries including: United States, Iran, Taiwan, Turkey and

China. All of these studies focused on only first stage laboring women but varied in sample criteria whether they included primiparous or multiparous women. Sample sizes ranged from 11-1,132 participants. All studies had to address the dependent variable of pain, but some also assessed the variables of patient satisfaction, maternal and neonatal outcomes, the labor process, parental behaviors, anxiety, cultural effects, neuroendocrine responses and Apgar scores. Specific limitations will be further described in each of the sections following but in general a major limitation was the scant amount of research that met inclusion criteria for these interventions. The following measures were used to determine pain level: Visual Analogue Scores (VAS), Short-form McGill Pain Questionnaire (SF-MPQ), Childbirth Experience Questionnaire (CEQ) and Labor Agency Scale.

### **Hydrotherapy**

“Hydrotherapy is the use of water, both internally and externally and at varying temperatures, for health purposes. Also known as water therapy, hydrotherapy includes such treatments as saunas, steam baths, foot baths, contrast therapy, hot and cold showers, and water therapy” (Wong, 2019, p. 1). Overall, findings are inconsistent in terms of how hydrotherapy decreases labor pain. The one thing that remains consistent is that researchers have found hydrotherapy has at least some effect on the first stage laboring mothers pain level. (Benfield et al., 2018; Benfield, et al., 2010; Lathrop et al., 2018; Tuncay et al., 2019; Lee et al., 2013; Mollamahmutoglu et al., 2012; Vanderlaan, 2019). This finding is consistent regardless of site differences, sample size and research method. In two studies, researchers found that many women eventually moved on to pharmacological pain management at some point during the use of hydrotherapy, however, hydrotherapy delayed their use of medications. “Therefore, researchers concluded that promotion of hydrotherapy before initiation of pharmacologic

methods is effective” (Vanderlaan, 2019, p. 407) and that although there may be minimal evidence of decreased pain with the use of hydrotherapy, it may still decrease overall use of some form of pharmacological pain management (Bonsack et al., 2018). This gives evidence towards a decrease in pain but not a largely significant one.

“When bathing for relief during painful contractions was studied, self-administered use of bathing by women was found to promote psychological and physiological relaxation” (Benfield et al., 2018, p. 112). Researchers have also reported that pain scores were lower in the water birth groups when compared to those with no form of pain management. When compared to those with an epidural, the drop in pain level was not as significant (Mollamahmutoglu et al., 2012). For example, those who had labored in water reported an average pain score of 4.7 while those in the group with an epidural reported an average pain score of 5.3. Mollamahmutoglu et al (2012) points out that the average pain score in women with no pain management interventions was 8.02, which is significantly higher than the average pain score in women who received an epidural or hydrotherapy. Lee et al. (2013) found that mean pain scores of the experimental group dropped significantly while pain scores increased significantly for the control group. This study showed a significant difference in how hydrotherapy affects pain levels which is consistent with what some of the other studies found. Tuncay et al. (2019) found that when cervical dilation was six centimeters, the average pain score was a 5 in the experimental group receiving hydrotherapy and a 7 in the comparison group receiving no form of pain management. Similarly, to the previously noted study above, this showed statistically significant decreases in pain levels when hydrotherapy was used. Similar findings were noted at ten centimeters when pain scores were significantly higher in the comparison group than in the experimental group receiving hydrotherapy (Tuncay et al., 2019). Women who initiated



hydrotherapy with higher original pain levels also had larger decreases in pain compared to those with lower original pain levels (Benfield, et al., 2010).

Overall, amongst the literature there is evidence to support that hydrotherapy can be effective in decreasing first stage labor pain. It can also be seen through these studies that the decrease in pain is not necessarily statistically significant for all cases. Also, with some of the studies, women had decreased pain but still decided to pursue some form of pharmacological pain management method however, delayed use of medication may also be desirable (Lathrop et al., 2018; Vanderlaan, 2019). Most studies had small sample sizes which causes limitations. This was due to the multitude of factors that can exclude laboring women from the use of hydrotherapy such as if women were being induced, abnormal vital signs or abnormal fetal heart rate tracings. Having these limitations creates gaps in the knowledge that can be obtained from these studies. It does not allow the ability to determine how this intervention affects first stage labor pain in those with these exclusion factors. Furthermore, small sample sizes caused by these exclusion factors impacts the generalizability of the research, thus, affecting its application to practice (Schmidt & Brown, 2019).

### **Therapeutic Touch**

Therapeutic touch is a healing modality used primarily by nurses to help people with discomfort, pain, and anxiety (Rick, 2020). It deals with the individual's energy field by massaging and touching the skin to move energy and help people become more comfortable (Çevik, & Karaduman, 2020). Therapeutic touch is a very common non-pharmacological pain intervention used during labor. Researchers have consistently found that therapeutic touch has a positive effect on pain management during labor (Chang et al., 2006). For example, in a randomized controlled trial conducted in Taiwan, the McGill Pain Questionnaire was used to

measure pain among laboring women. The study found that although massage did not affect labor pain characteristics, it decreased pain intensity and the amount of pain experienced. In fact, 87% of the experimental group subjects reported that massage was helpful, providing pain relief and psychological support during labor (Chang et al., 2002). Therapeutic massage also effectively decreased the intensity of labor pain in the 1st and 2nd phase of cervical dilation (Chang et al., 2006). These findings were similar with those reporting through surveys that use of sacral massage during the labor process reduced labor pain, decreased anxiety, and increased patient satisfaction of the labor process, while having no negative effects on the fetus (Çevik, & Karaduman, 2020; Gilbey, 2013). Massage therapy during labor has also been found to shorten the first stage labor, improve labor progress, and even improve Apgar scores at the first and fifth minutes of life (Bolbol-Haghighi et al., 2016). This is the only study that found positive effects of massage therapy towards the fetus, as evidenced by improvement of Apgar scores. When massage was compared with acupressure, 96.8% of women in the massage-only group, 93.3% of women in the acupressure-only group, and 100% of the women in the massage and acupressure group reported satisfaction with their intervention and intent to use it in their next delivery (Gönenç & Terzioğlu, 2020).

The findings of these studies answer the PICOT question by illustrating that labor pain represents a severe and widely varied pain experience that can be decreased via massage therapy. With the exception of one study, “Effects of Massage and Acupressure on Relieving Labor Pain,” the rest of the studies in question were limited by the use of only primiparous women. This leaves out multiparas, thus, creating a gap in knowledge and making it harder to generalize this information and incorporate it into practice.

### **Birthing Ball**

Birthing balls come in various shapes and sizes, and researchers have studied the effects of the regular birthing ball, as well as the peanut ball. “The peanut ball is an exercise or therapy ball that is shaped like a peanut: oblong shaped, larger on each end and slightly narrower in the middle. Peanut balls can be used for a variety of strength training or physical therapy needs as well as by laboring women” (David, n.d., para. 2). The birthing ball optimizes maternal positioning and decreasing pain by eliciting non-habitual movement (Gau et al., 2011). The peanut ball enables optimal position for pelvic opening thus helping to decrease pain (Roth et al., 2016). The use of the birthing ball has been found to decrease labor pains in first stage labor (Gau et al., 2011; Hickey & Savage, 2019; Mercier & Kwan, 2018; Roth et al., 2016; Taavoni et al., 2016; Taavoni et al., 2011; Yeung et al., 2019). These findings are consistent regardless of site, sample size, pain measure, samples of primiparous women, and demographic differences. For example, the smallest sample size included 60 primiparous women (Taavoni, et al., 2011) and the largest study included 512 targeted participants (Yeung et al., 2019). There were various methods of measurement used when recording pain including the Visual Analog Scale (VAS) and short form McGill Pain Questionnaire (SF-MPQ). Another study also measured self-efficacy using The Childbirth Self-Efficacy Inventory (CBSEI) (Gau et al., 2011). When the effect of birthing ball with heat therapy was studied, researchers found significantly lower pain scores for women who were treated with the therapy than those assigned to the control group. (Taavoni et al., 2016). With use of the peanut ball, there were other outcomes that researchers found, such as decreased length of time spent in first stage labor (Hickey & Savage, 2019; Roth et al., 2016) and decreased incidence of cesarean delivery (Hickey & Savage, 2019). Several studies showed that the implementation of this therapy was a non-invasive and relatively low-cost option to help adequately manage the pains associated with labor. (Taavoni

et. al, 2016; Taavoni et. al, 2011; Yeung et. al, 2019). This intervention is one that could easily be implemented in areas where there is low access to resources as it requires little to no training to put into effect. (Taavoni et al, 2016; Taavoni et. al, 2011; Yeung et al., 2019).

The findings of these studies support the PICOT question and emphasize that labor pain can be appropriately managed with the use of the birthing ball. The pain experienced during labor differs vastly among laboring mothers, however the use of the birthing ball was shown to decrease pain sensation. However, these studies are limited by specified age ranges for inclusion. There is no medical contraindication for specific ages and the use of the birthing ball. This excludes certain laboring mothers from participation, thus, creating a gap in knowledge. These gaps decrease the overall generalizability of the research.

### **Timeline to Project Completion**

As for the timeline of the project, the introduction and methods section were written by the middle of March 2020. They will continue to be revised throughout 2020-2021. Two of the independent study credits were taken in Fall of 2020 and two were taken in the Spring of 2021. The review of the literature section was written by the very end of March 2020. It was also edited throughout the 2020-2021 process. The critical appraisal of the evidence was written throughout the summer of 2020. Everything will be completely finished and ready to be submitted to Debra Horning, Michele Zelko, and Greta Lax in March or April of 2021. The final paper will be submitted to the William Honors College by April of 2021.

### **Critical Appraisal of the Evidence**

Although there were limitations in the literature pertaining to hydrotherapy, therapeutic touch, and the use of the birthing/peanut ball, the similarities in the findings amongst the

majority of the studies is reassuring. The studies also had reliability and validity within themselves thus creating a stronger argument.

### **Hydrotherapy**

When it comes to the literature regarding hydrotherapy, there are some limitations to the studies that were conducted. One of the biggest limitations seen in (Benfield, et al., 2010; Mollamahmutoglu et al., 2012; Tuncay et al., 2019; Vanderlaan, 2019) was that convenience sampling was used to select participants. According to Schmidt & Brown (2019), random sampling is the best way to elicit data that is more generalizable. Another limitation was that one of the pieces of literature Tuncay et al., (2019) only focused on primiparous women. Two others were limited due to small sample sizes used for data collection: these included Benfield et al., (2018) with a sample size of 11 and Benfield et al., (2010) with a sample size of 11 as well. Another significant limitation amongst all studies (Benfield et al., 2018; Benfield, et al., 2010; Lathrop et al., 2018; Lee et al., 2013; Mollamahmutoglu et al., 2012; Tuncay et al., 2019, Vanderlaan, 2019) was that hydrotherapy could only be used in labor that was not considered high risk. This excludes those who were induced, laboring prematurely or had conditions such as preeclampsia. Although these certain situations could not use hydrotherapy for safety reasons, it does decrease the amount of people who can participate thus decreasing the sample size. By excluding certain participants from the studies thus causing there to be smaller sample sizes it makes it harder to generalize this information to a larger population.

According to Schmidt & Brown (2019), validity is “the degree that an instrument measures what it is supposed to measure” (p. 264). In the literature on hydrotherapy, the information used to determine the effectiveness of hydrotherapy on labor pain have validity although some pieces addressed multiple variables such as anxiety and fear along with it. One

study Benfield et al., (2018) even included information regarding the difference between cultures and their views on bathing for pain relief. The validity may be questioned in Benfield, et al., (2010) because one of the main variables was anxiety but the variable of pain was addressed somewhat when they discussed drawing endorphin levels and how those related to the women's pain.

Regarding the literature on hydrotherapy, it appears to be pretty reliable because across the studies there is information in all to support that hydrotherapy does have at least some effect on labor pain whether it is a significant effect or not. Some studies showed although pain was decreased by hydrotherapy it may not have been decreased to an acceptable level because some women still pursued pharmacological pain management methods (Lathrop et al., 2018; Vanderlaan, 2019). Lee et al. (2013) found that in the experimental group which consisted of those who initiated hydrotherapy had decreases in pain while those in the control group who had no pain intervention showed increased pain levels. The studies would be more reliable in the event that the amount of the effect on pain control was consistent but overall, they consistently show at least some amount of pain relief. The reliability of the information is increased due to studies having settings in different countries such as Tuncay et al., (2019) & Mollamahmutoglu et al., (2012) which both took place in turkey, and Lee et al., (2013) which took place in Taiwan. These studies all look at the effectiveness of hydrotherapy on labor pain while also including women from different cultures. This is important because not one person handles pain the same and the way different cultures handle and view pain is different.

### **Therapeutic Touch**

The literature reviewed for therapeutic touch revealed that the use of massage and therapeutic touch techniques significantly decreased labor pain. However, the biggest limitation

to these results was that four of the six studies reviewed called for the use of primipara women only. Meaning, those who had given birth previously were excluded. None of the literature gave reasons for excluding these women. Another limitation would be that one study only used a homogeneous population from a single obstetrics clinic (Gönenç, I. M., & Terzioğlu, F., 2020). This study also excluded patients who had received epidurals and analgesia as well, even if therapeutic touch was an effective mediator for pain. One study even used the patient's support person as the one to be giving the therapeutic touch (Gilbey, A., 2013). This proved even more beneficial results and shortened the time of labor. Another study only used a small sample size of 60 primiparous women who were married (Chang, M.-Y., Chen, C.-H., & Huang, K.-F., 2006). This study also happens to be the same author for another study reviewed, which had similar results (Chang, M.-Y., Wang, S.-Y., & Chen, C.-H., 2002). Both studies also were outside of the search criteria, being published earlier than 5 years prior. However, the data found was significant enough to include in the results, as they both concluded that therapeutic touch decreases pain in the first stage of labor.

The articles reviewed proved to be reliable sources as they all produced the same results of decreasing labor pain characteristics. The studies involved were conducted in Taiwan, Turkey, and Iran, proving that methods for decreasing labor pain are congruent through different cultures around the world. One study, however, did not include a country population, but still got congruent results (Gönenç, I. M., & Terzioğlu, F., 2020). Throughout each study, randomized controlled trials were used to assign study participants into groups in which they receive therapeutic touch or not during labor. Those in the control group and received therapeutic touch techniques reported a decreased level of pain during the first stage of labor,

while those with no intervention did not. This was significant because all studies reviewed for therapeutic touch revealed a decrease in pain during labor.

### **Birthing Ball**

Regarding the use of the birthing ball in non-pharmacological pain management, there were limitations to these studies. The first limitation is that a few of the studies required participants to be within or above a specific level of gestation. One study required participants to be 30-34 weeks' gestation during the initial recruitment time (Gau et al., 2011). A few studies required women to be between 38-40 weeks' gestation (Taavoni et al., 2016; Taavoni et al., 2011). One study required women with gestational ages between 37-42 weeks (Yeung et al., 2019) and one study with requirements of at least 37 weeks completed gestation (Hickey & Savage, 2019). Another limitation of these studies had to do with language requirements. One study only included women who could speak, understand and write Chinese (Gau et al., 2011). Another study only included participants if they could speak English (Hickey & Savage, 2019). Many of the research studies required the participants to have a singleton pregnancy, with the fetus in the cephalic presentation (Taavoni et al., 2016; Taavoni et al., 2011; Yeung et al., 2019). Another common limitation was to include women who had already received a form of pharmacologic pain management such as an epidural (Hickey & Savage; Roth et al., 2016; Yueng et al., 2019). By only including women with specific inclusion criteria for the research studies, this leaves a gap in research for those excluded from the various studies.

The articles used to examine the effectiveness of the birthing ball on first stage labor have validity, however many of the studies also measures other variables. One study for instance does question the effectiveness of the use of the birthing ball by itself to help decrease labor pains, but it also measures another form of therapy: the use of heat packs. This study concluded that the



use of heat and the birthing ball when used to complement one another may decrease labor pains (Taavoni et al., 2016). Both of the peanut ball studies focus on decreasing time spent in labor and reduce the incidence of cesarean births. One study also focused on the women's report of self-efficacy during labor (Gau et al., 2011). It is important to note that there is a difference between the shapes and uses of the balls for these studies. These studies found evidence that pain scores decreased with use of the birthing ball (Gau et al., 2011; Taavoni et al., 2011), which suggest they have the highest validity to support the systematic review of literature.

The studies reviewed show a degree of reliability as well. Amongst different research studies, they yielded similar results. There was evidence to support the reduction of pain scores with the use of the birthing ball (Taavoni et al., 2011; Gau et al. 2011). These studies respectively were completed in Iran and Taiwan. The studies also used different design methods to help increase the reliability of the data. The studies included for the use of birthing and peanut balls were randomized control and quasi-experimental. With larger population sizes it can also be easier to generalize the information.

### **Synthesis of the Evidence**

There is evidence to suggest that hydrotherapy, therapeutic touch, and the use of the birthing ball or peanut ball are useful non-pharmacological methods of pain management. Each of these separately have evidence to support their efficacy in decreasing pain during the first stage of labor. For hydrotherapy, two studies found that although some laboring mothers decided to resort to a form of pharmacological pain management, hydrotherapy did help decrease their pain to some degree (Bonsack et al., 2018; Vanderlaan, 2019). Many other articles suggest that hydrotherapy shows a definite decrease in pain levels for laboring mothers (Benfield et al., 2018; Lee et al., 2013; Mollamahmutoglu et al., 2012; Tuncay et al., 2019). For therapeutic touch, all

articles reviewed provided strong evidence that massage and touch techniques decreased labor pain characteristics. Two studies concluded that therapeutic massage could shorten the first and second stages of labor by aiding in cervical dilation (Bolbol-Haghighi, N., Masoumi, S. Z., & Kazemi, F., 2016; Chang, M.-Y., Wang, S.-Y., & Chen, C.-H., 2002). One study even found evidence that therapeutic massage has an improving effect on APGAR scores at the first and five minutes of life (Bolbol-Haghighi, N., Masoumi, S. Z., & Kazemi, F., 2016). For the birthing ball and peanut ball, two articles developed strong evidence that the use of the birthing ball helps to decrease first stage labor pain (Taavoni et al., 2016, Gau et al., 2011). The research surrounding the use of the peanut ball suggests that using this as an intervention helps to reduce overall time spent in labor and decreases the incidence of a cesarean birth (Hickey & Savage, 2019; Roth et al., 2016). It can be concluded that the evidence found supports each individual non-pharmacological method in this systematic review, these methods can be used separately or together to help to decrease overall pain sensation in the first stage laboring mothers.

### **Recommendations**

All three of these non-pharmacological interventions have shown to be helpful in reducing pain during the first stage of labor. Although the studies are not consistent in the amount of pain being controlled, there is some evidence that use of hydrotherapy does decrease overall pain sensation. According to Benfield et al., (2018), “Knowledge gained from this and future studies can be directly applied in clinical practice by nurses, midwives, and physicians caring for women in labor, who desire noninvasive, low-risk yet efficacious anxiety and pain intervention.” (pg. 34). Based on the evidence presented in this systematic review, the use of hydrotherapy is a good option to decrease pain for women in labor. The main issue with hydrotherapy is that there are many instances in which it cannot be used such as if the patient has

an abnormal fetal heart rate tracing, the mom has conditions like preeclampsia or the mom has an epidural. This would make it so it could only be implemented in practice for certain women who meet the criteria for it. Based on the evidence provided in this systematic review, it can be concluded that hydrotherapy could be used as an acceptable way to decrease pain especially in mothers who would prefer to have an all-natural birth and not use any sort of pharmacological method of pain control.

As for further research that should be done regarding hydrotherapy one piece of literature suggests studying the postpartum outcomes on the neonate and the mom after use of hydrotherapy as a non-pharmacological pain management method (Tuncay et al., 2019). Since many of these studies are limited to primiparous women the research could be expanded to include women of any parity. The research could also be expanded to study the effect of hydrotherapy on perineal tearing. Two studies specifically addressed this, Lathrop et al., (2018) and Benfield et al., (2018) and it should be studied further to determine if this benefit is consistent amongst different groups.

Based on the evidence found in this systematic review, the use of therapeutic touch, the use of massage and other touch techniques should be considered in order to decrease labor pains. Many nurses and significant others of those laboring can utilize these non-pharmacological techniques in order to help mothers going through the first and second stages of labor without needing prescriptions from physicians. Further research should be done on multiparas, as they were excluded from trials during the screening process. Also, research could be done in order to examine how therapeutic touch can benefit women after birth, particularly during the fourth stage of labor when the uterus is contracting back into its normal size.

Based on the research provided for the birthing ball and peanut ball, use of the birthing ball and promoting different position changes have been shown to reduce first stage labor pains. Nurses can use the information acquired from these studies to help to foster and educate laboring mothers on the use of different birthing positions with the peanut and birthing ball in clinical practice. The use of heat therapy and the birthing ball can be used as a form of nonpharmacologic pain management and is relatively inexpensive and low risk to use (Taavoni et al., 2016). The peanut ball offers a low-tech method to help reduce labor time (Hickey & Savage, 2019). Current and future nurses can use this research to help achieve optimum birth outcomes for the neonates and their mothers. This research can also be used to help educate pregnant mothers on methods to help manage childbirth pain (Gau et al., 2011).

Implications for further research with use of the birthing ball or peanut ball should consider how to reduce limitations of the studies. Many studies were limited by ethnicity, age, parity, and gestational age all which reduce the generalizability of the research conducted. One study suggests that with the use of the birthing ball to reduce first stage labor pain, future research might be considered on studying its effects during pregnancy and postpartum (Taavoni et al., 2011).

### **Conclusion**

Pain during labor can be an anxiety provoking experience for many mothers. With so many different forms of pain control options, choosing the right one can be intimidating. There are a variety of different non-pharmacologic methods that can be used to help reduce first stage labor pains. This systematic review addresses three different methods and evaluates their efficacy through a review of the literature. Pain control during the first stage of labor is important because it can help to prevent negative neonatal and maternal outcomes. It has been concluded

through a detailed review of the literature that hydrotherapy, therapeutic touch, and the use of the birthing or peanut ball are effective in decreasing the sensation of pain in first stage laboring mothers. The research can be used to support the implementation of these methods into current clinical practice. These interventions offer a low-tech, low-cost method to help in the reduction of first stage labor pain. From this literature review, there is opportunity for further research implications regarding the use of these types of pain management methods. More research regarding the effects of these non-pharmacological interventions postpartum would prove beneficial, as numerous problems can arise during the postpartum period. However, for now these modalities have proven to be beneficial in decreasing pain for laboring mothers and should be considered in birthing plans throughout the world. Not only are they low cost, but anyone can use them. Whether it be from a significant other performing a lower back massage, a warm water bath at home, or a nurse encouraging the use of a peanut ball, these methods have shown through a review of multiple studies that they are effective in reducing pain during the first stage of labor.

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Appendix A

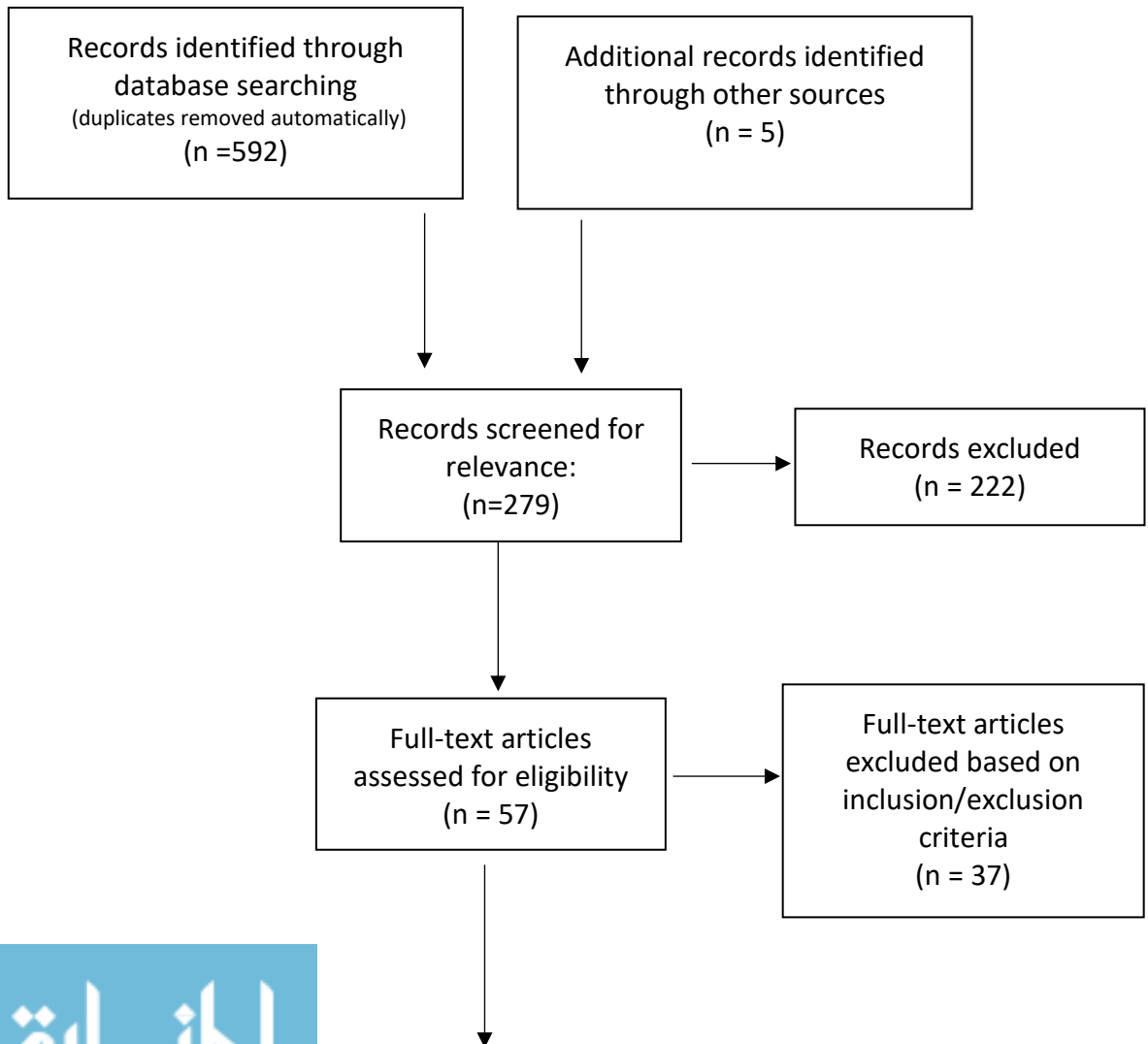
PRISMA 2009 Flow Diagram



Identification

Screening

Eligibility



Studies included in  
review  
(n = 20)

*From: Moher D, Liberati A, Tetzlaff J, Altman DG, The PRISMA Group (2009). Preferred Reporting Items for Systematic Reviews and Meta-Analyses: The PRISMA Statement. PLoS Med 6(7): e1000097. doi:10.1371/journal.pmed1000097*

For more information, visit [www.prisma-statement.org](http://www.prisma-statement.org).

## Appendix B

Systematic Review Table of Evidence<sup>[1]</sup>

APA formatted reference	Purpose statement. Research question <sup>[2]</sup> .	Clinical Practice Setting, Sampling methods, Sample size <sup>[3]</sup> .	Design. Level of Evidence. <sup>[4]</sup>	Findings, Conclusion <sup>[5]</sup>	Practice & Research Implications <sup>[6]</sup>	Critical Appraisal. Strengths and limitations <sup>[7]</sup>
1Tuncay, S., Kaplan, S., & Tekin, O. M. (2017). An Assessment of the Effects of Hydrotherapy During the Active Phase of Labor on the Labor Process and Parenting Behavior. <i>Clinical Nursing Research</i> , 28(3), 298–320. doi: 10.1177/1054773817746893	<p>Purpose Statement: to assess the effect of hydrotherapy applied during the active phase of delivery on the labor process, postpartum parenting behavior, and the feeling of labor for the mother. (pg 301)</p> <p>Research question: How does hydrotherapy when applied</p>	<p>Setting: L&amp; D Unit; Turkey</p> <p>Sampling method: Convenience; random for control vs experimental</p> <p>Sample size: 80 women 18-35 admitted to deliver</p>	<p>Design: Quasi-experimental; 2 groups</p> <p>Level of Evidence: 3</p>	<p>Lower pain scores at 6 and 10 cm in experimental group</p> <p>Lower systolic and diastolic blood pressures at 10 cm in the experimental group</p> <p>Lower second stage duration in experimental group</p>	<p>The article suggests that hydrotherapy be used as an alternative non pharmacological pain relief methods</p> <p>Future research should include outcomes and effects on the mom and baby</p>	<p>Limitations: convenience sample; only primiparous women; Normal GA, normal birth weight; intact membranes; single gestation only; control and experimental</p>

	during the active phase of delivery effect the labor process, postpartum parenting, behavior, and feeling of labor for the mother?					
2 Vanderlaan, J. (2017). Retrospective Cohort Study of Hydrotherapy in Labor. Journal of Obstetric, Gynecologic & Neonatal Nursing, 46(3), 403–410. doi: 10.1016/j.jogn.2016.11.018	Purpose:The primary aim of this study was to compare women's experiences in childbirth between water births and conventional births using a robust, validated measure. (pg 417). Research Question: Does giving birth in water affect women's	Setting:L&D Unit, recruited from community health centers Sampling method:convenience  Sample size:1,127 women	Design: quasi-experimenta l; 2 groups  Level of Evidence:3	Higher satisfaction with water birth than with epidural anesthesia Less severe lacerations in water birth 57.5% if patients did not progress to the use of pharmacologic al therapy	The article states that this can be used to help form realistic expectations for the use of hydrotherapy Also explored the use of hydrotherapy in patients who had an IOL	Convenience; only cat 1 FHT; control and experimental; large sample size

	childbirth experiences when compared to conventional birth?					
3. Lathrop, A., Bonsack, C. F., & Haas, D. M. (2018). Women's experiences with water birth: A matched groups prospective study. <i>Birth</i> , 45(4), 416–423. doi: 10.1111/birt.12362	<p>Purpose: The purposes of this study were to provide estimates of hydrotherapy tub use for nurse-midwifery-managed hospital births in the United States and to describe the characteristics associated with the use of hydrotherapy</p> <p>Pg 407</p> <p>Research Question: What characteristics are associated with hydrotherapy and how prevalent</p>	<p>Setting: small community hospital L&amp;D unit</p> <p>Sampling method: stratified; 2 groups experimental and non experimental</p> <p>Sample size: 66 water 132 conventional</p>	<p>Design: quasi experimental</p> <p>Level of Evidence: 3</p>	<p>Hydrotherapy before initiation of pharmacologic pain management can be successful for pain management in labor</p> <p>Most women left the tub and chose to go to a pharmacologic method at some point</p> <p>Better experiences with water births</p>	<p>“Given the evidence from this study and those cited above, clinicians are justified in counseling pregnant women that those who actually give birth in the water have at least comparable and possibly more positive experiences in labor than those who use epidural anesthesia”</p> <p>Pg 421</p> <p>Water births could result in less perineal tearing</p>	Doesnt discuss pain numbers and associations; self assignment to categories; small sample size for the experimental group

	should it's use be?					
4 Benfield, R., Heitkemper, M. M., & Newton, E. R. (2018). Culture, bathing and hydrotherapy in labor: An exploratory descriptive pilot study. <i>Midwifery</i> , 64, 110–114. doi: 10.1016/j.midw.2018.06.005	<p>Purpose: The purpose of this pilot study was to explore pregnant women's experiences of bathing, bathing in labor, and cultural beliefs about bathing</p> <p>Research Question: How is bathing in labor affected by beliefs and culture and how does this affect pain, anxiety and relaxation?</p>	<p>Setting: low risk obstetric clinics</p> <p>Sampling Method: convenience</p> <p>Sample Size: 41 &gt;37 weeks gestation</p>	<p>Design: Descriptive</p> <p>Level of Evidence: 6</p>	<p>Women who bathe, report relief of anxiety, menstrual and labor pain and promotion of mental and physical relaxation.</p> <p>The women described bathing as relaxing, easing, calming, and efficacious for relief of menstrual cramps and labor contractions.</p>	<p>Caution those &lt; 37 weeks on hydrotherapy</p> <p>Helped with labor pain but also soothed preterm cramps</p>	<p>Small sample size;</p>
5. Mollamahmutoglu, L., Moraloglu, O., Ozyer, S., Su, F. A., Karayalcin, R., Hancerlioglu, N., ... Dilmen, U. (2012). The effects of immersion in water on labor, birth and newborn and comparison with epidural analgesia and conventional vaginal delivery. <i>Journal of the Turkish German</i>	<p>Purpose: : The aim of this study is to document the practice of labour in water, to</p>	<p>Setting: Zekai Tahir Burak Women's Health Education and Research Hospital</p>	<p>Design: quasi-experimental</p>	<p>VAS pain scores were lower in the water birth group but not significantly different</p>	<p>1st stage not shortened by laboring in water</p>	<p>Convenience sample</p> <p>Strength: control groups for comparison; large sample size</p>

<p>Gynecological Association, 2012(1), 45–49. doi: 10.5152/jtgga.2012.03</p>	<p>assess the effects of water immersion during labour and/ or birth (labour stages 1, 2 and 3) on maternal, fetal and neonatal wellbeing and to compare the outcomes and safety with conventional vaginal deliveries and deliveries with epidural analgesia.</p> <p>Research Question: How does the use of water during the first, second and third stages of labor affect maternal, fetal and neonatal well being when compared</p>	<p>Sampling Method: convenience</p> <p>Sample size: 610 total Experimental group: 207 2 Control group of 191 and 204</p>	<p>Level of Evidence: 3</p>		<p>Smaller lacerations after hydrotherapy</p> <p>“Water birth may be an alternative birth method that can be offered in selected patients.”</p> <p>Pg 49</p>	
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	with conventional vaginal deliveries and deliveries with epidural anesthesia?					
6. Chang, M.-Y., Wang, S.-Y., & Chen, C.-H. (2002). Effects of massage on pain and anxiety during labour: a randomized controlled trial in Taiwan. <i>Journal of Advanced Nursing</i> , 38(1), 68–73. doi: 10.1046/j.1365-2648.2002.02147.x	<p>Purpose: To investigate the effects of massage on pain reaction and anxiety during labor.</p> <p>Research Question: Does massage have an effect on pain and anxiety during labor?</p>	<p>Setting: Regional hospital in southern Taiwan between September 1999 and January 2000.</p> <p>Sampling method: A randomized controlled study with an experimental and a control group</p> <p>Sample size: 83 primiparous women</p>	<p>Design: Random experimental trial and control group.</p> <p>Level of Evidence: 2</p>	<p>The experimental group had significantly lower pain reactions in the latent, active and transitional phases. Anxiety levels were only significantly different between the two groups in the latent phase. Twenty-six of the 30 (87%) experimental group subjects reported that massage was helpful, providing pain relief and psychological support during labour.</p>	<p>“Administrating massage in the intervention group cannot change the characteristics of pain during labor but it can positively influence on pain intensity and reduce this aspect at latent and active phase of cervical dilation.” Pg. 286</p>	<p>This study only included primiparous women</p>

<p>7 Gönenç, I. M., &amp; Terzioğlu, F. (2020). Effects of Massage and Acupressure on Relieving Labor Pain, Reducing Labor Time, and Increasing Delivery Satisfaction. <i>Journal of Nursing Research</i>, 28(1). doi: 10.1097/jnr.0000000000000344</p>	<p>Purpose: The aim of this study was to compare the effects of massage and acupressure on labor-related pain management, duration, and satisfaction with delivery.</p> <p>Research Question: Does massage and acupressure have an effect on labor related pain?</p>	<p>Setting: A women's health, education, and research hospital between August 8, 2012, and March 8, 2013.</p> <p>Sampling method: random with three intervention groups: massage only, acupressure only, and massage with acupressure</p> <p>Sample size: 120 women</p>	<p>Design: Randomized controlled trial. Set up as a clinical trial. Experimental and control groups, 3 in total</p> <p>Level of Evidence: 2</p>	<p>In terms of satisfaction with their intervention, 96.8% in the massage-only group, 93.3% in the acupressure-only group, and 100% of the massage + acupressure group expressed satisfaction with their intervention and intent to use in their next delivery</p>	<p>“The results of this study indicate that the dual application of massage and acupressure is relatively more effective than either therapy applied alone and that massage is more effective than acupressure.”</p> <p>Pg. 1</p>	<p>This study was carried out in a single obstetrics clinic on a homogeneous population.</p> <p>This study excluded patients who opted for an epidural and other levels of pain management. the effects of acupressure and massage on those concurrently using analgesia or anesthesia in labor were not evaluated.</p>
<p>8 Çevik, S. A., &amp; Karaduman, S. (2020). The effect of sacral massage on labor pain and anxiety: A randomized controlled trial. <i>Japan Journal of Nursing Science</i>, 17(1). doi: 10.1111/jjns.12272</p>	<p>Purpose: This study was conducted to determine the effect of sacral massage on labor pain and anxiety</p> <p>Research Question:</p>	<p>Setting: Bağcılar Hospital, Obstetrics and Gynecology Clinic between March and October 2016.</p> <p>Sampling method: randomized and controlled experimental study</p> <p>Sample size: 60 primiparous women</p>	<p>Design: randomized experimental and control groups</p> <p>Level of Evidence: 2</p>	<p>It was concluded that sacral massage applied during labor reduced women's labor pain, lowered the levels of concern and anxiety, led to greater feelings of satisfaction among pregnant</p>	<p>The use of sacral massage during labor reduced labor pain and decreased anxiety. This caused an increase in their satisfaction of the labor process, while having no</p>	

	<p>1. Does massage applied to the sacral region decrease the perception of a woman's labor pain?</p> <p>2. Does massage applied to the sacral region decrease the woman's levels of concern and anxiety about labor?</p> <p>3. Does massage applied to the sacral region increase the women's satisfaction with the labor.</p>			<p>women in terms of labor, positively affected the perception of labor and had no fetal side effects.</p> <p>Pg. 8</p>	<p>negative effects on the fetus.</p>		
9	<p>Gilbey, A. (2013). Does massage therapy or the presence of an attendant affect pain, anxiety and satisfaction during labour? <i>Focus on Alternative</i></p>	<p>Purpose: To investigate the effects of massage and presenting an</p>	<p>Setting: November 2009 till April 2010 at Baharlou university hospital in Tehran, Iran.</p>	<p>Design: 3 groups divided into massage, attendant</p>	<p>Conclusion: Findings suggest that massage is an effective</p>	<p>The supportive role of presenting an attendant can positively</p>	<p>This study only used primiparous women.</p>

<p><i>and Complementary Therapies</i>, 18(3), 155–156. doi: 10.1111/fct.12037</p>	<p>attendant on pain, anxiety and satisfaction during labor to clarify some aspects of using an alternative complementary strategy.</p> <p>Research Question: Can massage, as a safe pain relieving method, adequately control labor pain appropriately ?</p>	<p>Sampling method: Random sampling</p> <p>Sample size: 120 primiparous women with term pregnancy</p>	<p>and control groups randomly.</p> <p>Level of Evidence: 2</p>	<p>alternative intervention, decreasing pain and anxiety during labor and increasing the level of satisfaction.</p>	<p>influence the level of anxiety and satisfaction.</p> <p>This can mean a partner or even the nurse.</p>	
<p>10 Chang, M.-Y., Chen, C.-H., &amp; Huang, K.-F. (2006). A Comparison of Massage Effects on Labor Pain Using the McGill Pain Questionnaire. <i>Journal of Nursing Research</i>, 14(3), 190–197. doi: 10.1097/01.jnr.0000387577.51350.5f</p>	<p>Purpose: The purpose of this study was to describe the characteristics of pain during labor with and without massage</p> <p>Research Question:</p>	<p>Setting: The study took place at a medical center in southern Taiwan.</p> <p>Sampling method: randomized and controlled experimental study; Pain characteristics were measured as responses by the laboring women to the</p>	<p>Design: participants were randomly assigned to either a massage or control group and tested using the self-reported Short-Form</p>	<p>Higher pain scores were positively associated with increasing cervical dilation from one phase to the next. However, the study found that massage can effectively</p>	<p>“Massage is a cost-effective non-pharmacological intervention, particularly in Taiwanese culture where analgesics are not the primary choice</p>	<p>Same author or number 6; study is from 2006</p> <p>The patient’s partners provided the massage therapy during contractions, so the effectiveness of the massage could vary depending on the</p>

	What effects does massage have on the characteristics of pain during labor?	Short-Form McGill Pain Questionnaire  Sample size: 60 primiparas in labor who were married	McGill Pain Questionnaire  Level of Evidence: 2	decrease the intensity of labor pain in the 1st and 2nd phase of cervical dilation.	for pain management.” Pg. 195  This study took place in Taiwan, where the people are more knowledgeable about the effects of massage on pain relief.	efficiency of the partner.
11. Bolbol-Haghighi, N., Masoumi, S. Z., & Kazemi, F. (2016, April). Effect of Massage Therapy on Duration of Labour: A Randomized Controlled Trial. Retrieved from <a href="https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4866196/">https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4866196/</a>	Purpose: This study is aimed to evaluate the effect of massage therapy on the duration of labor.  Research Question: What effect does massage therapy have on the labor process?	Setting: Fatemieh Hospital in Shahroud.  Sampling method: Random with questionnaires completed in several stages.  Sample size: 100 pregnant women referred to the hospital's maternity ward	Design: Randomized controlled clinical trial  Level of evidence: 2	Conclusion: Massage therapy during labour led to shortening of labour first stage duration, improvement of labor progress and Apgar scores at first and fifth minutes and as a noninvasive, safe, accessible and low cost method can decrease the complications related to the prolonged labour and at	“Massage therapy during labor will lead to the shortening of the first and second stage of labor duration and even improve Apgar scores at the first and fifth minute of scoring.”  Pg. 2	

				the end promote normal childbirth.		
12. Kwan, M., & Mercier, R. (2018). Impact of Peanut Ball Device on the Duration of Active Labor: A Randomized Control Trial. <i>American Journal of Perinatology</i> , 35(10), 1006–1011. doi: 10.1055/s-0038-1636531	<p>Purpose: To examine the effects of using the peanut ball in active laboring patients.</p> <p>Research Question: Does the use of a peanut ball device shorten the duration of active labor in nulliparas?</p>	<p>Setting: Single labor and delivery unit of an academic medical center in Philadelphia, PA.</p> <p>Sampling method: non blinded randomized selection at 6 cm dilation</p> <p>Sample size: 96 nulliparas</p>	<p>Design: Randomized controlled trial</p> <p>Level of Evidence: 2</p>	<p>Conclusion: There were no major differences in demographic or medical characteristics between the intervention groups. Women in the peanut ball group did have a shorter duration of time in active labor though this result was said to be not statistically significant.</p>	The use of the peanut ball may help shorten the active labor period.	This study only used English speaking nulliparous women over the age of 18. Other parts of the population might be excluded.
13 Hickey, L., & Savage, J. (2019). Effect of peanut ball and position changes in women laboring with an Epidural. <i>Nursing for Women's Health</i> , 23(3), 245–252. doi: 10.1016/j.nwh.2019.04.004	<p>Purpose: Examine the effect of a nurse-driven intervention of peanut ball with position changes on length of labor and</p>	<p>Setting: 407 bed, nonprofit, magnet designated baby friendly hospital with 8 labor and delivery suites.</p> <p>Sampling method: Convenience</p>	<p>Design: Quasi Experimental</p> <p>Level of Evidence: 3</p>	<p>Conclusion Women assigned to the peanut ball were reduced by half to have a cesarean birth. Use of the peanut ball may be an</p>	Use of peanut balls may help reduce c-section delivery. Peanut ball use is a low tech, high-touch intervention to	Lack of randomization for participants. This study excluded individuals who did not speak English. This study also uses the pharmacologic pain management

	<p>incidence of cesarean birth</p> <p>Research Question: How does the use of peanut ball and position change affect the length of labor and incidence of cesarean birth among women receiving epidural anesthesia?</p>	<p>Sample size: 343</p>		<p>option to help decrease incidence of c-section delivery.</p>	<p>possibly improve overall vaginal birth experiences. (pg. 251)</p>	<p>of epidural placement.</p>
<p>14 Taavoni, S., Sheikhan, F., Abdollahian, S., &amp; Ghavi, F. (2016). Birth ball or heat therapy? A randomized controlled trial of the effectiveness of birth ball usage with sacrum-perineal heat therapy in labor pain management. <i>Complementary Therapies in Clinical Practice, 24</i>, 99–102. doi: 10.1016/j.ctcp.2016.04.001</p>	<p>Purpose: Investigate the effects of two non-pharmacological methods such as birth ball and heat therapy on labor pain relief</p> <p>Research Question: How does the use of birth</p>	<p>Setting: large general public hospital of Iran University of Medical Sciences, Tehran, Iran.</p> <p>Sampling method: Convenience</p> <p>Sample size: 90 primiparous women aged 18-35 years old</p>	<p>Design: Randomized control trial</p> <p>Level of Evidence: 2</p>	<p>Conclusion Heat therapy and birthing ball use can be used to help manage labor pain as a low cost method.</p>	<p>Easy methods to apply to help manage pain.</p> <p>Women need less use of narcotic/epidural analgesia</p>	<p>Heat may be related to another MOA-endorphins.</p> <p>Women who received the birthing ball were in an upright position compared to others that were in supine positions.</p>

	ball and sacral-perineal heat therapy affect labor pain and duration of the active phase of physiologic labor?					
15 Gau, M.-L., Chang, C.-Y., Tian, S.-H., & Lin, K.-C. (2011). Effects of birth ball exercise on pain and self-efficacy during childbirth: A randomized controlled trial in Taiwan. <i>Midwifery</i> , 27, 293–300. doi: 10.1016/j.midw.2011.02.004	<p>Purpose: Examine the effectiveness of a birth ball exercise program during childbirth by measuring childbirth self-efficacy and childbirth pain.</p> <p>Research Question: How does the use of a birth ball exercise program during childbirth affect reported self-efficacy and</p>	<p>Setting:Regional hospital at one medical center with 600-1022 births annually at 2 birth units</p> <p>Sampling method: randomization</p> <p>Sample size: 188</p>	<p>Design: Randomized controlled trial</p> <p>Level of Evidence: 2</p>	<p>Conclusion Implementation of the birth ball program showed an increase in women who reported self-efficacy and reduced pain while in labor</p>	<p>Confidence can help decrease pain sensation and perception during labor.</p> <p>These methods could be used to help decrease pharmacologic interventions</p>	<p>There was not an equal amount of people in the control vs. experimental group. This study also only used Chinese women, therefore the research only can be said for this ethnicity.</p> <p>This article is also from 2011, so more current research may be available.</p>



	childbirth pain?					
16 Lee, S. L., Liu, C. Y., Lu, Y. Y., & Gau, M. L. (2013). Efficacy of Warm Showers on Labor Pain and Birth Experiences During the First Labor Stage. <i>Journal of Obstetric, Gynecologic &amp; Neonatal Nursing</i> , 42(1), 19–28. doi: 10.1111/j.1552-6909.2012.01424.x	<p>Purpose: To determine the efficacy of warm showers on parturition pain and the birth experiences of women during the first stage of labor.</p> <p>Research Question: How does the use of a warm shower affect parturition pain and the birth experience of women during the first stage of labor?</p>	<p>Setting: maternity ward of a Taipei City regional teaching hospital</p> <p>Sampling method: Random</p> <p>Sample size: 41-control 39- experimental</p>	<p>Design: Randomized controlled trials</p> <p>Level of Evidence: 2</p>	<p>Conclusions: improved childbirth experience and decreased labor pain</p> <p>Pain scores were less in experimental group compared to the control</p>	<p>Less pain can increase the reward of the experience</p> <p>Different water temperatures could have different effects; should be further studied</p>	<p>Not even group sizes; smaller experimental Random sampling is a strength some women had to leave the water due to rapid delivery and other emergent situations</p>
17. Benfield, R. D., Hortobágyi, T., Tanner, C. J., Swanson, M., Heitkemper, M. M., & Newton, E. R. (2010). The Effects of Hydrotherapy on Anxiety, Pain, Neuroendocrine Responses, and Contraction Dynamics During Labor. <i>Biological Research For</i>	<p>Purpose: to determine the effects of hydrotherapy on</p>	<p>Setting: low-risk obstetrical clinics at the County Health Department and the university's School of</p>	<p>Design: Pretest-posttest (quasi-</p>	<p>Conclusions: minimal difference in pre immersion</p>	<p>"Knowledge gained from this and future studies can be directly</p>	<p>Convenience sample; small sample size</p>

<p>Nursing, 12(1), 28–36. doi: 10.1177/1099800410361535</p>	<p>anxiety,pain, neuroendocrine responses and contraction dynamics during labor</p> <p>Research Question: How does hydrotherapy affect anxiety, pain, neuroendocrine responses and contraction dynamics during labor?</p>	<p>Medicine and from two private obstetrical practices.</p> <p>Sampling method: convenience</p> <p>Sample size:11</p>	<p>experimentally)</p> <p>Level of Evidence: 3</p>	<p>and immersion pain levels</p> <p>Larger decreases in women with higher pre immersion pain levels</p> <p>Increased endorphin levels correlating with increased tub time</p>	<p>applied in clinical practice by nurses, midwives, and physicians caring for women in labor, who desire noninvasive, low-risk yet efficacious anxiety and pain intervention.”</p> <p>Page 34</p> <p>Can also further be researched to determine neuroendocrine responses related to labor pain and the use of hydrotherapy</p>	<p>Did not draw endorphin levels on all women during all time frames</p>
<p>18. Yeung, M. P. S., Tsang, K. W. K., Yip, B. H. K., Tam, W. H., Ip, W. Y., Hau, F. W. L., Wong, S. Y. S. (2019). Birth ball for pregnant women in labour research protocol: A multi-centre randomised controlled trial. <i>BMC Pregnancy and Childbirth</i>, 19(153). doi: 10.1186/s12884-019-2305-8</p>	<p>Purpose: Evaluate the effectiveness, safety and harm of birth ball use by pregnant women in</p>	<p>Setting: Obstetrics and Gynecologic units at public hospitals in Hong Kong, China</p> <p>Sampling method: Random</p>	<p>Design: Randomized Controlled Trial</p> <p>Level of Evidence: 2</p>	<p>Conclusion</p> <p>Birth balls are used commonly amongst laboring mothers in OB units. This</p>	<p>Birth balls are a simple and non-invasive method to help control pain.</p>	<p>Use of other non-pharmacologic methods to help reduce pain.</p>

	<p>labor compared to treatment as usual</p> <p>Research Question: How does the use of the birth ball affect pain intensity, satisfaction with pain relief and childbirth experience, and sense of control in labour?</p>	Sample size: 512		research could be used to promote a safe and effective method for pain management.	This method could easily be translated into practice in areas with trace resources.	
<p>19. Roth, C., Dent, S. A., Parfitt, S. E., Hering, S. L., &amp; Bay, R. C. (2016). Use of the peanut ball during labor. <i>Wolters Kluwer Health</i>, 41(3), 140–146. doi: 10.1097/NMC.0000000000000232</p>	<p>Purpose: Evaluate the efficacy of the peanut ball use on duration of first stage labor and pushing for women who scheduled an elective induction.</p> <p>Research Question:</p>	<p>Setting: Large Magnet designated community hospital</p> <p>Sampling method: Random</p> <p>Sample size: 143</p>	<p>Design: Randomized Controlled Trial</p> <p>Level of Evidence: 2</p>	<p>Conclusion Among women who had an elective induction, those women who used the peanut ball had a shorter labor</p>	<p>Use of the peanut ball may decrease labor time in primiparous patients</p>	<p>This study includes the use of a pharmacologic intervention along with the non-pharmacologic intervention. This study also had specific criteria for inclusion in the study &gt;18 yrs old, and had to have an elective induction of labor. Those who</p>

	Does the use of the peanut ball during labor in women having an elective induction of labor and epidural analgesia decrease duration of first stage labor and pushing time?					did not meet the inclusion criteria could not participate.
20. Taavoni, S., Abdollahian, S., Haghani, H., & Neysani, L. (2011). Effect of birth ball usage on pain in the active phase of labor: A randomized controlled trial. <i>Journal of Midwifery &amp; Women's Health</i> , 56(2), 137–140. doi: 10.1111/j.1542-2011.2010.00013.x	<p>Purpose: Evaluate the effectiveness of use of a birth ball on labor pain, contractions, and duration of the active phase of labor.</p> <p>Research Question: How does the use of a birth ball affect labor pain, contractions, and duration</p>	<p>Setting: Large general public hospitals of Iran University of Medical Sciences, in Tehran, Iran.</p> <p>Sampling method: Convenience</p> <p>Sample size: 60 primiparous women aged 18-35</p>	<p>Design: Randomized controlled trial</p> <p>Level of Evidence: 2</p>	<p>Conclusion Use of the birthing ball helps to reduce the perception of pain experienced during labor. Pain scores were lower in those with use of the birthing ball.</p>	<p>Low cost, easy intervention to implement.</p> <p>Could be used in areas with lack of access to resources.</p>	<p>Labor was only measured for 120 minutes max, so if women had longer labors it would not have included all stages. Homogenous population of women included in the study.</p> <p>This article is also from 2011, so there may be more current research available.</p>

	of the active phase of physiologic labor?					
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