



Most Effective Route of Analgesia during Labor: A Retrospective Study in Makkah Region 2019

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Abstract: The study aims to detect the most effective route of analgesia during labor, and to evaluate maternal satisfaction and the effect of analgesia in the mode of delivery. A retrospective observational design was used on data from Department of gynecology and obstetrics at Maternity and Children hospital in Makkah, from January 2019 to March 2019. The study interviewed obstetricians and focused the dissection on three questions (the most effective type of analgesia, maternal satisfaction, and dose analgesia effect on the delivery mode). The data was derived from the patient notes for three months in a total of 392 cases. Analysis of the notes and observation showed that the most effective method is epidural analgesia. While several pharmacological and non-pharmacological options exist for labor pain, epidural anesthesia remains the gold standard for severe pain. It substantially affects maternal satisfaction during one of the most painful periods of a woman's life.

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1. Introduction

Childbirth is recognized as the most aesthetic experience of a woman individual life. Studies state that this overall experience is shaped by various physical, psychological, and cultural factors (Najafi et al., 2017; Aragão et al., 2019; Souza et al., 2019). The exaggerating physical pain during labor has underpinned as the factor which promotes women to go for a cesarean section (C-section) worldwide (Wassen et al., 2014; Hu et al., 2015). American College of Obstetricians and Gynecologists (ACOG) agreed that labor pain is extremely severe, and no woman should experience or bear it while it can be controlled (ACOG, 2006). Generally, labor pain management strategies include non-pharmacological, pharmacological, and regional analgesia (Sprawson, 2017). Souza et al. (2019) highlighted the pharmacological analgesia is the one where different drug-based interventions are used for overcoming the pain during childbirth. Cammann (2003) describes that pain originates from different sites during labor and childbirth. In the first stage of labor, pain is transmitted via the spinal nerves of T10–L1 and results from uterine contractions and dilatation of the cervix. In the second stage, stretching of the pelvic ligaments causes pain via the pudendal nerve originating from the S2–S4 nerve roots (Figure 1) (Jones et al., 2012).

ACOG has also recognized analgesia as a safe intervention for pain and physical discomfort during

pregnancy. World Health Organization (WHO) (2018) reports that providing this analgesia is important for the women who request it and can only be refused in case of medical contraindication to the existing procedures, or the absence of personnel and infrastructure in low resourced environments (Osterman et al., 2011). Gallo et al. (2018) have shown the effectiveness of the non-pharmacological intervention (including pelvic motion sitting on a ball, showers, and massage). The difference among the interventions varies based on the different settings (Volmanen et al., 2011; Aragão et al., 2019), which require nurses to be trained on the different interventions to help in the pain relief management during childbirth (Health and Social Care Information Centre, 2011). Generally, pharmacological analgesia is observed for improved satisfaction among the patients during labor and further increases the desire of the patient for labor induction for future pregnancies (Sodha et al., 2017). Considering the difference in the population characteristics, for instance, advanced maternal age, obesity as well as other medical complexity, that disrupt the pregnancy offering of pharmacological analgesia and its effectiveness serves as a challenge (Ortiz-Gómez et al., 2016).

Hellams et al. (2018) documents that these characteristics increase the maternal mortality rate as

well as adverse perinatal outcomes. Not only this, but every year, millions of women are affected by severe maternal morbidity (SMM) during pregnancy, childbirth, or the postpartum period (Hellams et al., 2018). Most studies confirm that the safe and effective use of analgesic for labor pain is still a big challenge (ACOG, 2006; Wassen et al., 2014; Hu et al., 2015; Najafi et al., 2017; Aragão et al., 2019; Souza et al., 2019). Moreover, the methods of analgesia for labor pain vary across countries depending on many factors, including knowledge, culture, and more. Despite these

variations, all have one method in common, which is epidural analgesia. Epidural analgesia is the most effective method for labor pain; the use of this method is increasing globally day after day due to perfect pain relief and high maternal satisfaction. However, its understanding and use in an Arab country, concerning its effectiveness during labor is not appropriately highlighted, particularly Saudi Arabia. Thereby, this research aims to provide the obstetrician with an overview of analgesic options in labor concerning current evidence.

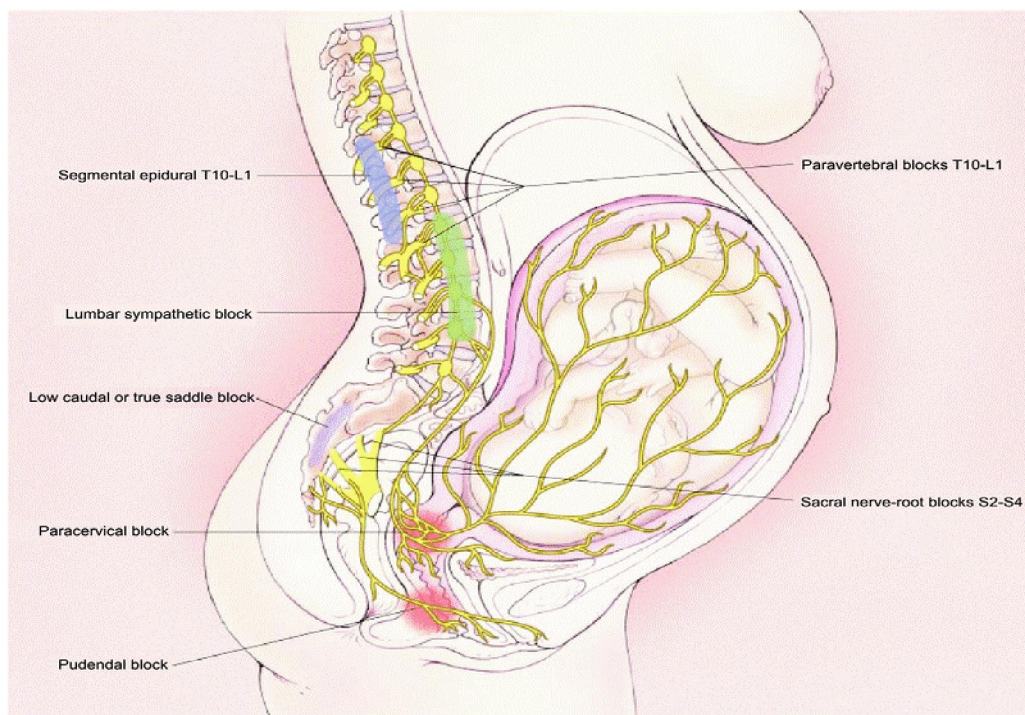


Figure 1: Pain Originating Sites (Souza et al., 2019)

2. Material and Methods

Study Design

This study used a retrospective observational method, using the available data to investigate, analyze, and explain findings. The selection of this design is twofold; one it helps in investigating, analyzing, and explaining the obtained results, and secondly, existing researches have also established its efficacy for deriving holistic findings (Sigdel et al., 2018; Lim et al., 2018).

Study Setting

The study is conducted in Makkah in the Kingdom of Saudi Arabia (KSA). The rationale for the selection of Makkah is that it is 153,128 km² in area with a population of 2,004,888 million (as per the 2018 review of World Population). Moreover, it also comprises of over 47 health centers which avail and provide medical care around the city, maternity and

children hospital is specialized in obstetrics and gynecology as one of the biggest hospitals in Makkah.

Study Sample

The sample of the study constitutes of 10 anesthesia obstetrician and patients notes that observed 392 cases that underwent delivery at maternity and children hospital in Makkah. These 392 cases were retrospectively collected from the hospital record in Makkah. The 392 cases in 3 months (Jan 2019 to March 2019) were observed, with an average of 1,568 cases per year and 130 cases per month. Among the identified cases, 258 epidural analgesia cases were found for every 3 months, with an average of 86 epidural analgesia cases per month, and the other 134 cases of general anesthesia and spinal anesthesia. The inclusion and exclusion criteria are shown in Table 1.

Table 1: Inclusion and Exclusion Criteria

Inclusion Criteria	Exclusion Criteria
Above 18 years of age	Less than 18 years of age
At least three years of experience (for obstetrician)	Less than three years of experience (for obstetrician)

Ethical Consideration

Prior to the research, its protocols were approved by the Medical Ethics Committee of the Hospital in Makkah. Since the study was retrospective and required the anonymous collection of data, therefore, no written consent form was obtained.

Data Analysis

The collected data for the cases were presented in statistical form using Microsoft excel, whereas, the interviewed anesthesia obstetrician dissected based on three questions;

- The most effective type of analgesia
- Maternal satisfaction
- Dose analgesia affects the mode delivery

3. Results

The analysis of the cases revealed that among the total of 392 delivery cases, 258 (65.8%) cases used Epidural analgesia, and 83 (21.1%) cases used Spinal analgesia, and 51 (13.1%) cases used IV pethidine (Table 2).

Table 2: Different Methods of Analgesic Administration

Method	Frequency	Percentage
Epidural	258	65.8%
Spinal	83	21.1%
IV pethidine	51	13.1%

Dissection

The interview with the obstetrician and the patient's notes has been categorized into three types of interventions; namely, nonpharmacological, pharmacological, and local analgesia.

Nonpharmacological

The findings reveal that nonpharmacological methods for labor pain may be useful for mild pain or as adjacent to severe pain. Not only this, but these are generally inexpensive, easy to institute, and offer low risk; however, lack of evidence is found which supports its effectiveness for pain reduction (from severe to moderate) (Sprawson, 2017). Some techniques that may assist in the nonpharmacological method are as follow;

Prenatal information

The interviews reveal that providing women with prenatal information about the labor experience, including analgesic options, relieves their labor pain, which is in-line with earlier researches (ACOG,

2006). All care providers are expected to provide appropriate resources to women through documented information or the availability of specialists such as obstetric anesthetists. The Obstetric Anesthetists Association (OAA) has produced some information resources about pain relief and related topics for patients and their care practices in a web portal (LabourPains.com). The resources are free of charge and available in several languages (Sprawson, 2017). The National Childbirth Trust (NCT) runs classes and seminars nationally that provide information and practical sessions for women on topics, including pain relief during labor (Sprawson, 2017).

Continues one-to-one support and the care provider

The interview notes reveal that the perception towards the pain is substantially impacted by the attitude and the behavior of the caregivers.

Water Immersion

The interview noted further reveal the use of warm water during the labor at any stage or time. The mechanism followed in it is believed to increase the uterine perfusion physiology for reducing the pain, which increases the endorphin and oxytocin release, leading to an increase in maternal satisfaction (Niven and Murphy-Black, 2000).

Massage

In it, the soft tissues of the body, which have been used in labor, are manipulated for relaxing the muscles. The findings of the interview highlight that preference varies among patient considering its time. Such as, some prefer massage after each contraction to relax the tired muscle.

Acupuncture and Acupressure

Acupuncture involves the insertion of fine needles into specific parts of the body. Other related techniques include acupressure-applying pressure on the acupuncture point. It uses fingers or small beads instead of needles at the same points on the skin. These techniques are ancient healing arts, which are regarded as conventional medicine in the Far East. The aim is to stimulate acupuncture points located on the hands, feet, and ears (Vickers and Zollman, 1999; Simkin and Klein, 2012).

Transcutaneous electrical nerve stimulation

In labor, the electrodes from the Transcutaneous Electrical Nerve Stimulation (TENS) machine are attached to the lower back placed about 2 cm over the T10-L1 dermatomes either side of the spinous processes to provide analgesia for the first stage of

labor. The second set of electrodes is placed over the S2-4 dermatomes for second-stage pain relief. Low-intensity, high-frequency (100-200 Hz) TENS stimulates the A fibers at these dermatomes blocking pain transmission to the brain. Lower frequency causes the release of endorphins (Reynolds, 1998; Habanananda, 2004).

Aromatherapy

Aromatherapy is the use of essential oils, highly concentrated aromatic substances extracted from plants by process of distillation or cold compression. The mechanism of action for aroma-unclear: the oils are thought to increase the secretion of the body's sedative, stimulant, and relaxing neurotransmitters (paracrine and endocrine) by activation of the limbic system. They may be massaged into the skin, or inhaled by using an infusion (Habanananda, 2004).

Sterile water injections

The incidence of low back pain in labor is estimated to be anything up to 75 %. Sterile water administered intradermally can be used to reduce this pain. Intracutaneous injections of sterile Imp water are used at four sites in the lower back, approximately corresponding to the borders of the sacrum. A small bleb is produced by injection of approximately 0.1 mL of water between the layers of the skin. Two are placed 3-4 cm, either side of that (Reynolds, 1998).

Hypnosis

Hypnosis has been described as a state of narrowly focused attention, reduced awareness of external stimuli, and an increased response to suggestions-positive statements used in order verbal or non-verbal and result in apparent spontaneous changes perception, mood, or behavior. These therapeutic communications are directed to the person's subconscious and the independent of any conscious effort or reasoning. Learn self-hypnosis, which can be used in labor to reduce the pain (Mantle, 2000; Madden et al., 2011).

Pharmacological

In labor, there are limited pharmacological options. These can be subdivided as opioid and non-opioid and classified by route of administration; during labor, any medication should be offered adequate information to a pregnant woman.

Nitrous oxide (gas and air)

Nitrous oxide probably does not interfere with endogenous oxytocin and is unlikely to affect the labor process or spontaneous vaginal birth rate. While it crosses the placenta readily, nitrous oxide does not affect the fetal heart rate or respiratory rate in the newborn (Rooks, 2011). Common adverse effects include lightheadedness, nausea, vomiting, and, less commonly, hallucinations, hyperventilation, and tetany.

Opioids

Interview notes reveal that the most used opioids include dihydrocodeine, pethidine, diamorphine, fentanyl, and remifentanyl. Intramuscular pethidine is the most commonly used opioid worldwide for labor analgesia (Bricker and Lavender, 2002).

Local Anesthesia

Local anesthesia was also deployed for reducing the labor pain through anesthesia injection into women vagina or its surrounding area. Also, the number of medications impacts the pain, and its particularly useful before episiotomy or laceration repairment. However, it fails to demonstrate reporting efficiency of in labor pain contradictions

Epidural Anesthesia

Epidural anesthesia is the most effective method of pain control during labor. Epidural anesthesia involves the placement of a small catheter into the lower back by an anesthesiologist. (Figure 2). Some side effects reported include the drop in the blood pressure, which slows the heartbeat of blood. This can be prevented through the intake of fluid using IV prior to the epidural, and changing the position of the mother for better circulation. This must follow the monitoring of the mother's blood pressure; heartbeat as well as fetus heartbeat., which leads to the slow labor process.

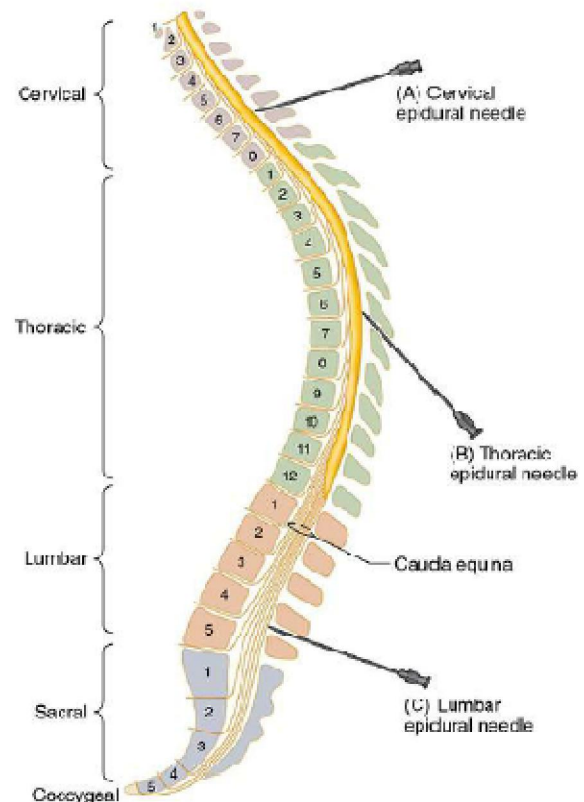


Figure 2: Small catheter into the lower back (Jones et al., 2012)

Spinal Block

It is generally injected at the lower back of the spinal cord (Figure 3). There is no use of catheter as it is injected in the spinal fluid. It is generally used for the cesarean births when the baby is not required to be pushed out by the mother. Since the lower half of the

body is numb, no pain is felt. Also, its working is more effective as compared to the epidural, while constituting of the similar side effects as epidural anesthesia. The patients often complain of spinal headache after spinal block (Jabbari et al., 2013).

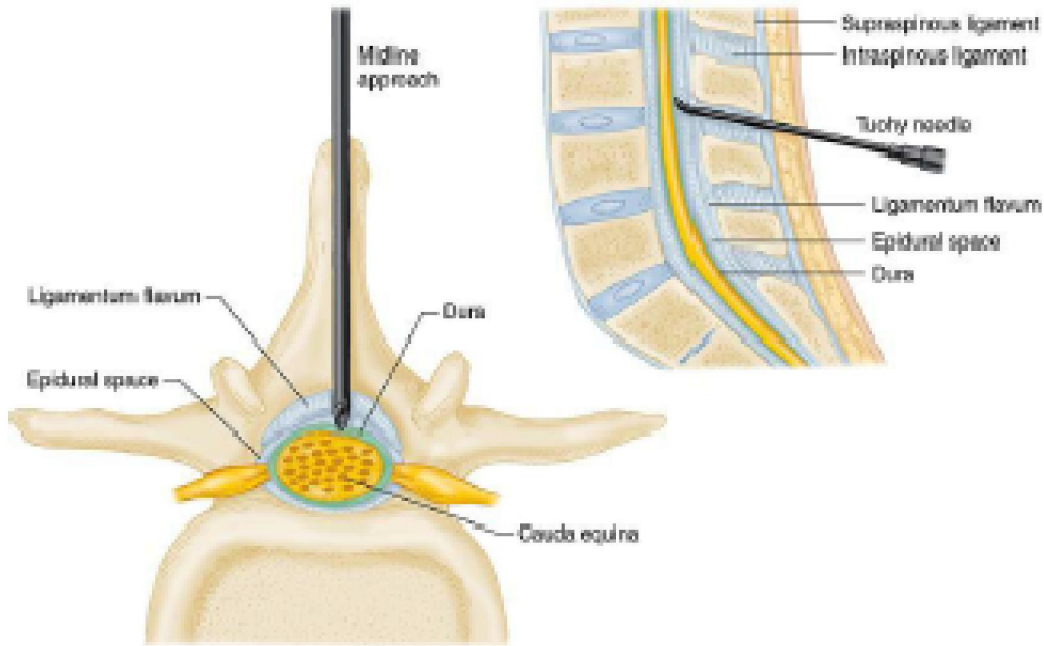


Figure 3: Spinal Block (Lower Back) (Jones et al., 2012)

Combined Spinal-epidural (CSE)

Table 3: Effective Route of Analgesia During Labor

Evidence available	Analgesia
Shown to be effective	Epidural
	Combined spinal-epidural
	Continues on-to-one support
	IV pethidine
May be effective	Water Immersion
	Nitrous oxide
	Narcotics
	Local anesthetic

CSE generally involves epidural needle insertion in the lumbar epidural space. Initially, the subarachnoid is injected following placement of the epidural catheter and lastly epidural medication administration. This technique is observed to be more beneficial as compared to the conventional epidural given its easy installation, choice of ambulation throughout delivery, which allow the use of an epidural catheter in the C-section or later analgesia (Niesen and Jacob, 2013). However, Aragão et al.

(2019) outlined that combined spinal-epidural analgesia has an increasing incidence of pruritus as compared to epidural with low doses of local anesthetic.

Based on the overall evaluation, the effective route of analgesia during labor are summed up in Table 3. It is observed that an effective route for analgesia primarily includes epidural, combined spinal-epidural, continues one-to-one support, and IV pethidine. Whereas, the effectiveness of water immersion, nitrous oxide, narcotics, and a local anesthetic is still found to be questionable.

4. Discussion

The results of the study show epidural anesthesia as effective during labor. Even though epidural anesthesia is observed to lower the process of labor, various studies endorse its use and effectiveness (ACOG, 2006; Wassen et al., 2014; Hu et al., 2015; Najafi et al., 2017; Aragão et al., 2019; Souza et al., 2019). In the study, the perception of pain is also reported to be dependent on the caregiver attitude and behavior. This is consistent with the previous

research, which also highlighted the role of caregiver in forming the perception towards pains (National Institute for Health and Care Excellence, 2014; Sigdel et al., 2018). It has been found that the presence of designated midwives during the childbirth, lowers the need for analgesic, instrumental delivery as well as dissatisfaction with the childbirth. Another way to provide non-medical care is through self-funding of a companion (or doula) (Hodnett et al., 2011).

This water immersion technique is observed to reduce pain. This is consistent with the findings of Cluett and Burns (2009), which showed that the use of water immersion, i.e., laboring in water is observed to be less painful as compared to others. The time of the labor first stage is observed to decrease, and it also requires less use of neuraxial analgesia for those randomized to labor. No difference was found concerning the cesarean delivery, vaginal delivery, oxytocin use, perineal trauma, as well as maternal infection (Sprawson, 2017). Massage is also found to reduce the muscle spasm, provide a soothing feel, help distract attention from pain, reduces the pain intensity. Accordingly, the use of pain pressure is observed to be effective in providing an anesthetizing effect (Jones et al., 2012).

Concerning the opioids, the results of Ullman et al. (2010) review reveal that parenteral opioids are effective for decreasing the labor pain, which causes adverse impact on the maternal and fetal. This includes the incidence of drowsiness, urine retention, hypoventilation, nausea/vomiting, and an increase in gastrointestinal transit time (with a risk of aspiration). For the epidural anesthesia, the study showed the continuous medication infusion using a catheter for attaining a stagnant anesthesia level (Jones et al., 2012).

The findings of the study are consistent with the earlier researches conducted in other regions. Such as the United States (Stark, 2003), where about 1.6 million women out of 4 million are more likely to opt for epidural analgesia during childbirth. Similarly, a study in Finland (Räisänen et al., 2014) showed that 66.55 percent of women had requested epidural analgesia for relief in labor pain relief while the percentage for epidural analgesia exceed 97 percent in Brazil (De Orange et al., 2012).

These results propose that the knowledge concerning the labor epidurals should be improved especially at the progressing stage of pregnancy. It is recommended as it helps in improving the patient's decision making as well as labor care quality. The national institute for clinical excellence also recommends the education of pregnant woman on the options and availability of effective analgesia in labor to ensure that they receive optimal pain management during childbirth. Consequently, the Ministry of

Health, as well as the Family Health Bureau, should contribute to the literacy of the Public Health Midwives concerning the effective route of analgesia. Dissemination of the education material can also prove to be effective for resolving all concerns, which lead to the avoidance of epidural analgesia.

Conclusion

Childbirth is the most exciting and unique experience of a woman life. Though, this pain is extremely severe for both mothers and the fetus. For analgesia, a request from pregnant women is enough. Analgesia in labor plays a crucial part in affecting maternal satisfaction during one of the most painful periods of a woman's life. The study discussed the main analgesic options such as nonpharmacological, pharmacological, as well as local analgesia that exist for the laboring woman. It showed that while several pharmacological and non-pharmacological options exist for labor pain, epidural anesthesia remains the gold standard for severe pain with high maternal satisfaction.

Abbreviations

American College of Obstetricians and Gynecologists (ACOG)
 Cesarean Section (C-section)
 Combined Spinal-Epidural Analgesia (CSE)
 National Childbirth Trust (NCT)
 Obstetric Anesthetists Association (OAA)
 Spinal Nerve 2 (S2)
 Spinal Nerve 4 (S4)
 Severe Maternal Morbidity (SMM)
 Transcutaneous Electrical Nerve Stimulation (TENS)
 World Health Organization (WHO)

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