



Systematic Review / Meta-analysis

## Pharmacologic and non-pharmacologic labor pain management techniques in a resource-limited setting: A systematic review

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### ABSTRACT

**Background:** Despite improvement in pain management programs, labor pain is mostly ignored especially in low and middle-income countries.

**Methods:** The aim of this study is to establish a clear clinical working guideline for labor pain management in resource limited settings. This systematic review is conducted in line with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline 2020. After formulating clear criteria for the evidences to be included an appropriate method of searching was conducted by using the Pub Med, Google scholar and Cochrane library using the following MeSH terms: ('Parenteral opioids' AND 'Labor pain', 'Labor' AND 'Pain management', 'Non-pharmacologic methods' AND 'Labor pain', 'Labor pain management AND [massage therapy](#)). The study quality of literatures was categorized based on WHO 2011 level of evidence and degree of recommendation. Final conclusions and recommendations are done with the analysis of risk and benefits of alternative management strategies for non-regional techniques of labor pain management. The study is registered with research registry unique identifying number (UIN) of 1267 "<https://www.researchregistry.com/browse-the-registry/#registryofsystematicreviewsmeta-analyses/>." and the study is moderate based on AMSTAR 2 quality assessment criteria/[https://amstar.ca/Amstar\\_Checklist.php](https://amstar.ca/Amstar_Checklist.php).

**Discussion:** Combined forms of Non-pharmacologic and selected low dose pharmacologic approaches of labor pain management, provides significant benefits to women and their infants. During provision of labor analgesia complications may happen and the service provider should involve in the management of those complications. **Conclusion:** This study has a paramount importance to practice the most reliable, available and cost effective method of labor analgesia.

### 1. Introduction

Labor is a physiological phenomenon described as regular, painful uterine contraction associated with uterine ischemia during contraction, effacement, dilation of cervix, stretching of the vagina, perineum, and compression of pelvic structures[1].

Labor pain is the worst pain women encounter during their reproductive age [2], associate with negative emotions: anxiety, fear and low sense of security, which encourages opted caesarean section [3,4]. Even if labor pain varies among individuals[5],nearly 80% of pregnant women worry labor pain during their pregnancy[4,6].

Pain stimulates the respiratory system, increase minute ventilation, oxygen consumption and hyperventilation may cause respiratory

alkalosis and reduction in the amount of blood transported to the fetus. Moreover, pain, anxiety, and stress during delivery can cause an increased release of catecholamine's and cortisol into the circulation, which increase feto-maternal complications [7].

Selections of non regional labor pain management are based on simplicity, safety and preservation of fetal homeostasis, which enhance women's satisfaction, and reducing the need for obstetric interventions [3,8,9].

Continuous labor support (physical comforting and emotional support) is one of the most widely used non pharmacological methods of pain relief, and it has many advantages like having shorter labors, reduced need for oxytocin, analgesia, instrumental deliveries, and a decreased cesarean section by 50% [10,11].

*Abbreviations:* IM, Intramuscular; IV, Intravenous; PRISMA, Preferred Reporting Items for Systematic Reviews and Meta-Analyses.

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## 2. Justification

Even though labor pain is different among individuals it is not well practiced especially in middle and low-income countries [12]. Lack of awareness, misunderstanding regarding acceptability, safety, and availability of pain relief options are considered to be the main reasons why women in many low and middle-income countries fail to receive adequate pain relief [13]

The overall utilization non-pharmacologic methods labor pain management is 40.1%, where as utilization of pharmacologic obstetric analgesia methods were found to be zero(7, 10).

Developed countries considered labor analgesia as an essential part of intrapartum care and all women have the choice of access to all range of pain relief options for labor and delivery(12). In low and middle-income countries the most common form of pain relief is the continuous support of companions during labor, but the provision of further pain relief in labor is often neglected [10,12,14].

In Ethiopia, 6.5–10% of women have received delivery service at health facilities, which shows the practice of labor pain management is very low(8), in addition there is no standardized utilization of non-pharmacologic labor pain management in our setup, So this systematic review will have better contributions in labor pain management.

## 3. Objectives

To standardize and increase the quality of care in labor pain management by using available and cost effective resources with minimal complications.

## 4. Methods

The study is conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guideline 2020 [15] as shown in (Fig. 1). After formulating clear criteria for the evidences to be included an appropriate method of searching was conducted by using the Pub Med, Google scholar and Cochrane library using the following MeSH terms:('Parenteral opioids' AND' Labor pain', 'Labor' AND 'Pain management, 'Non-pharmacologic methods 'AND 'Labor pain', 'Labor pain management AND [massage therapy](#)), were used to draw evidences.

The study quality literatures were categorized based on WHO 2011 level of evidence and degree of recommendation (Table 1). Final conclusions and recommendations are done with the analysis of risk and benefits of alternative management strategies for non-regional techniques of labor pain management.

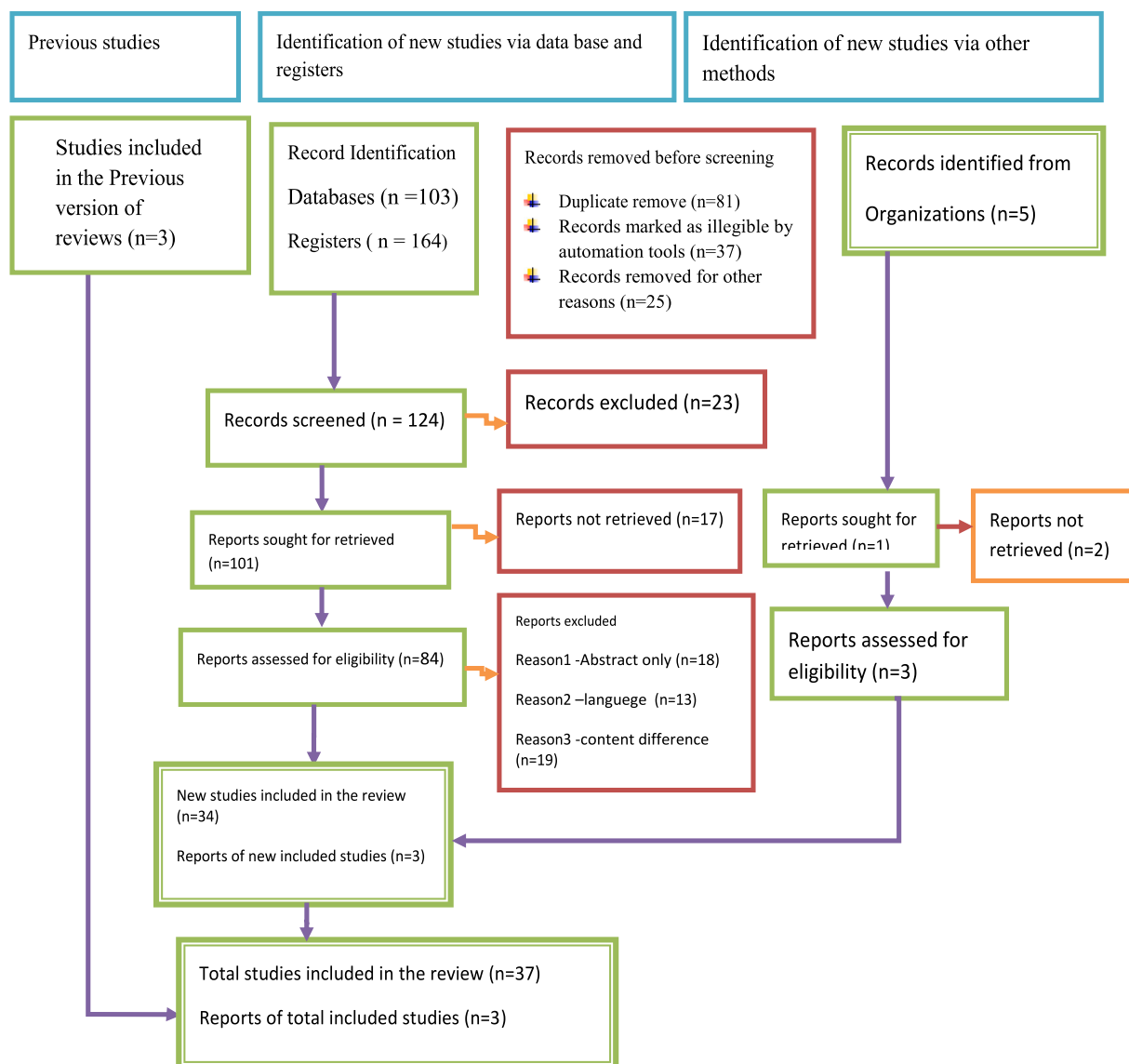


Fig. 1. Flow chart for selection of studies using 2020 PRISMA flow diagram.

**Table 1**  
WHO 2011 level of evidence and degree of recommendation.

| Level | Type of evidence                                      | Degree of recommendation                 |
|-------|---|--|
| 1a    | Meta analyses, systematic reviews of RCTs             | Strongly recommended/directly applicable |
| 1b    | Systematic review                                     | Highly recommended/directly applicable   |
| 1c    | Randomized clinical trials/RCTs                       | Recommended/applicable                   |
| 2a    | Systematic reviews of case control or cohort studies. | Extrapolated evidence from other studies |
| 3a    | Non-analytic studies, e.g. case reports, case series  | Extrapolated evidence from other studies |

The study is registered with research registry unique identifying number (UIN) of 1267 "<https://www.researchregistry.com/browse-the-registry#registryofsystematicreviewsmeta-analyses/>.", and the study is moderate based on AMSTAR 2 quality assessment criteria//[https://amstar.ca/Amstar\\_Checklist.php](https://amstar.ca/Amstar_Checklist.php).

#### 4.1. Selection of studies

In this study original articles, Meta analysis, systematic review, randomized control trial, comparative and cross sectional studies on pharmacologic and non pharmacologic labor pain management written in English were included.

Full articles no longer available online and studies with different language but unable to translate to English language were excluded in this review. All of the illegible articles that were identified from searches of the electronic databases were imported into the ENDNOTE software version X7.1 (Tomson Reuters, USA) and duplicates were removed. Before findings had begun, full length articles of the selected studies were read to confirm for fulfilling the inclusion criteria.

##### 7.1 Area of Controversies.

A study in Nezerland recommends that pethidine use be discouraged in favor of other opioids due to the risk of toxicity from the accumulation of the metabolite norpethidine and associated neuro excitatory effects [16], while another research concludes that pethidine remains popular in many obstetric units, is easy to administer and useful analgesic modality [17], which is supported by high level evidences that intramuscular (IM) or intravenous (IV) pethidine at low doses, of up to 50 mg, is safe to administer during labor [18–20].

Intravenous acetaminophen is less effective for analgesia in early labor compared with intravenous morphine. On the other hand a study conducted in United Kingdom states that morphine is highly respiratory depressant drug and shows acetaminophen is more effective than iv opioids in controlling pain during labor with fewer maternal and fetal side effects [17,21].

High level evidences shows that non-opioids drugs like non-steroidal anti-inflammatory drugs, paracetamol, sedatives are used to control mild to moderate pain, but some studies fails to support a role for non-opioids drugs on their own to manage pain during labor [21–23].

So this study might solve the controversies associated with different studies to develop a clear working guideline for labor analgesia.

## 5. Discussion

Labor analgesia prevents adverse events associated with stress responses to pain, including postpartum depression [24]. The American College of Obstetricians and Gynecologists recognizes that a woman's request for labor pain relief is a sufficient medical indication for its provision [25].

Studies shows that 75 mg intramuscular diclofenac is with 600 mg intramuscular or 1g PO paracetamol or 100 mg intramuscular tramadol and effective in labor pain relief during the first stage of labor with

minimal maternal and fetal complications among those drugs intramuscular paracetamol is simple, cost-effective, has fewer maternal side effects, and feasible option as labor pain relief in resource limited settings [26, 27], which is supported with a study conducted in Egypt shows that Paracetamol appears to be a safe and effective medicine that can be used during the intrapartum period but it may result liver failure in patient liver problem [28].

A systemic review concludes that IM) or IV pethidine at low doses, of up to 50 mg, is safe to administer during labor. It can be given intermittently as doses of 25–50 mg IV, with an onset of action of 5–10 min and duration of 2–3 h [18].

Even through tramadol is produces less constipation and respiratory depression, it is a pro-conversant like nor meperidine and should be avoided in patients prone to seizure activity such as pre-eclampsia [29].

Opioid analgesia is an option for pain relief in labor. Morphine with dose of 0.1–0.15 mg/kg intramuscularly and Tramadol with doses of 1–2 mg/kg body weight (50–100 mg 4 hourly) can be used safely. Even opioids may lack effectiveness after 7 cm of dilation, it is helpful and satisfactory pain management strategy for many parturient [30, 31]. Opioids that have a rapid offset and lack active metabolites like fentanyl (25–50 mcg every hour or as a continuous infusion of 0.25 mcg/kg/h) is advantageous to women and newborns [32]. A study comparing IV fentanyl with IV pethidine in labor analgesia resulted IV fentanyl has fewer adverse effects in both mother and new born. Despite its disadvantages, pethidine remains popular in many obstetric units, is easy to administer and may be a useful analgesic modality where other methods are not available or contraindicated [33].

A systemic review conducted in England show that Parenteral opioids may have maternal effects like nausea, vomiting, sedation and respiratory depression and fetal effects such as neonatal respiratory depression, decreased neonatal alertness, inhibition of suckling and a delay in effective feeding. Therefore maternal and fetal monitoring is important and the complications should be managed accordingly (dexamethasone 4 mg iv or cimetidine 200 mg iv for nausea vomiting) [17]. Maternal side effects of opioids are dose dependent and include nausea, vomiting, sedation, pruritus, respiratory depression and disorientation, which is affected by maternal drug concentration, molecular weight of the drug, placental blood flow and the pH and protein levels within maternal and fetal blood [28, 34]. In order to treat fetal respiratory depression secondary to maternal opioids administration 0.1 ml/kg of naloxone is administer directly to the new born, to reverse maternal respiratory depression, secondary to opioids over dose 0.4 mg of intravenously naloxone should be given [32]. The fetal effects of opioids can be assessed by intrauterine ultrasound and fetus scope monitoring or Apgar score after delivery, since some neonate needs resuscitation with 0.5-1mcg/kg iv naloxone(1). Most studies agree that opioids are contraindicated in patient having respiratory disease, renal problems as well as neurological diseases [35], non-steroidal anti-inflammatory drugs have result in upper gastro intestinal(GI) bleeding; induced reduction in prostaglandin levels can precipitate acute renal failure and are contraindicated in patients with renal failure, gastro intestinal(GI) bleeding as well as heart failure [36].

A high level evidence study in Canada states that None pharmacologic approaches to relieve pain during labor provide significant benefits to women and their infants without causing additional harm(8), which is supported by a study conducted in Ethiopia shows that 43.3%, of labor pain management was non-pharmacologic whereas pharmacologic method was nil(10). A randomized control trials in Iran, highly recommends massage (in the sacrum and cervical region) to relief pain for Primiparous women [37], which is supported with a study concludes that massage therapy during labor shortening first stage of labor, improves labor progress, Apgar scores and cost effective method promotes the normal childbirth [38].

Continuous labor supports are effective form of labor analgesia, which increases clients satisfaction and gives a negative rating of childbirth experience [4]. In addition it improves spontaneous vaginal delivery, shorter duration of labor, decreased caesarean section, and instrumental vaginal delivery, use of any analgesia [11,39].

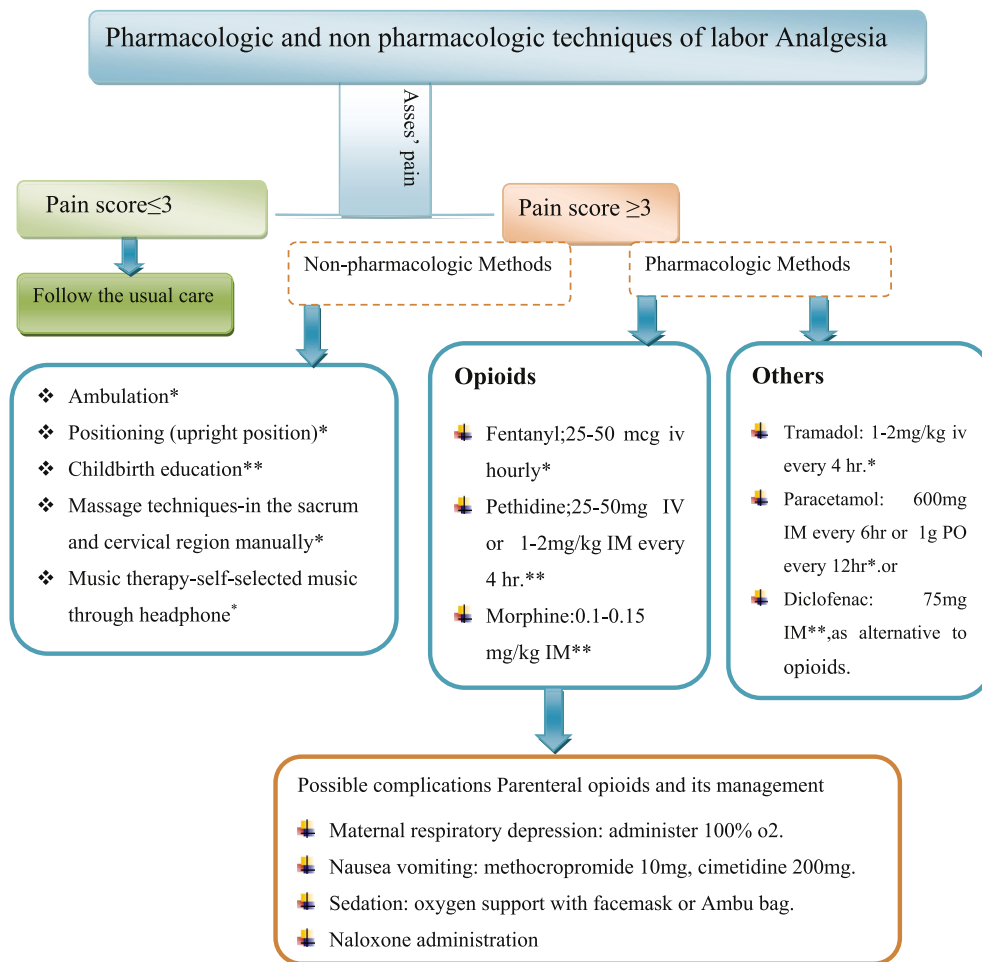
Studies showed that music and music-assisted relaxation techniques and change in position significantly reduce labor pain. It proposed that music reduces level of anxiety, catecholamine production and provides 'distraction' to pain during laboring, in addition it causes the body to release endorphins to counteract pain [30,40].

### 6. Conclusion

This study has a paramount importance to practice the most reliable, available and cost effective method of labor analgesia.

**Strength:** Uses the latest PRISMA2020 guideline to find illegible studies.

**Limitation-** Only freely available full articles written in English is included and the bias of the study is not statically assessed.



\* = strongly recommended

\*\* =recommended

#### Tips

- ❖ Use the pharmacologic agents with combination to non- pharmacologic methods\*\*
- ❖ Drugs should be avoided for the following patients
  - ⚠ Opioids: - respiratory disease, neurological impairment, renal disease\*.
  - ⚠ Diclofenac:-gastro intestinal bleeding, renal disease, heart failure\*\*.
  - ⚠ Paracetamol: - patients with liver problem\*.

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**Ethical approval**

Not Required.

**Author contribution**

Amare Anley Beyable = study concept or design, literature search, and, duplicate removal\* Samuel Debas Bayable = data interpretation, writing the paper\* Yitayal Guadie Ashebir = Check grammar and plagiarism\* \* = approve manuscript.

**Consent**

Not required.

**Registration of research studies**

reviewregistry1267.

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**Provenance and peer review**

Comments from the editor and Reviewers were well addressed with authors and comments were incorporated in the manuscript before send the revised form for publication.

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**Declaration of competing interest**

No conflict of interest.

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### Acronyms and Abbreviations

*IM*: Intramuscular

*IV*: Intravenous