



ORIGINAL ARTICLE

Comparison of pain scores in laboring patients receiving morphine and fentanyl.

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ABSTRACT... Objective: To compare the effectiveness and side effects of morphine and fentanyl for pain relief in laboring patients. **Study Design:** Quasi-experimental study. **Setting:** Ghurki Trust Teaching Hospital, Lahore. **Period:** 18-10-24 to 17-01-25. **Method:** A total of 34 laboring patients (17 per group) aged 18 to 45 years with singleton pregnancies in active labor were included. Pain relief was assessed using the Visual Analogue Scale (VAS) at 30, 60, and 120 minutes post-administration. Side effects and neonatal outcomes were also recorded. Data analysis included repeated measures ANOVA for pain scores and the chi-square test for categorical variables. **Results:** Pain relief, side effects, and maternal satisfaction levels were compared between the two groups. The findings provide insights into the potency, safety, and patient experience associated with each opioid. **Conclusion:** The study findings will help guide clinical decision-making for optimal labor analgesia, ensuring better maternal comfort and neonatal safety.

Key words: Labor Analgesia, Opioids in Labor, Pain Scores.

INTRODUCTION

Over the last three decades, caesarean section (CS) rates have been increasing in many countries to unprecedented levels. Labor pain has been identified as an important reason for women to request CS.¹

Childbirth is one of the most painful events that a woman is likely to experience, the multidimensional aspect and intensity of which far exceeds disease conditions.²

Pain is a highly personal experience, and no two people feel pain the same way. A person's report of their own pain is the best measure. Women are encouraged to make decisions about pain relief in labor in the antenatal period based upon their expectations of what labor pain will be like.

The pain of labor in the first stage is mediated by T10 to L1 spinal segments, whereas that in the second stage is carried by T12 to L1, and S2 to S4 spinal segments.³ Labor pain management is not only a crucial concern for future mothers

but also a great challenge in modern medicine. A wide range of both pharmacological and nonpharmacological labor pain relief techniques are currently available for pregnant women in worldwide. Epidural anesthesia (EA) is the most effective method of pain relief during labor.³

However, it is rarely available in many parts of the world mainly because it requires a skilled anesthesiologist for administration, the administration technique is complicated, and it requires continuous monitoring.⁷ In many low- and middle-income countries, there are not enough obstetrical anesthesiologists and very limited resources. That's why we are left with the intravenous options of opioids and non-opioids.⁴

Fentanyl is one of the short acting opioids recommended by World Health Organization for pain relief during labor.¹ Fentanyl provides good analgesic effect for pain management during labor by considerably reducing the duration of the active phase, and can therefore be used as an acceptable analgesic agent during labor.

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The optimal labor opioid has a rapid onset and offset of action; rapid metabolism and elimination; and minimal undesired maternal, fetal, and neonatal side effects. The analgesic should not affect the woman's ability to participate in labor and birth. Fentanyl usually exerts its analgesic effect at 1–1.5 mcg/kg. (same as above) However, this dosage can be adjusted by the physician considering sedation and analgesia. Fentanyl's side effects are similar to those of heroin, which produce euphoria, confusion, respiratory depression (which, if extensive and untreated, may lead to arrest), drowsiness, nausea, visual disturbances, dyskinesia, hallucinations, delirium, a subset of the latter known as "narcotic delirium," analgesia, constipation, narcotic ileus, muscle rigidity, constipation, addiction, loss of consciousness, hypotension, coma, and even death.⁵

Intravenous (IV) morphine sulfate has a rapid onset of action near 1–2 minutes and it reaches a peak of action in 5–15 minutes; it has a half-life of 1.5–2 hours with a duration of action near 3–4 hours. Side effects of morphine include hypotension, bradycardia, seizures, confusion, itching, rash, and respiratory depression.⁶

The objective of this study is to compare the pain scores in laboring patients receiving morphine and fentanyl and to compare the side effect of morphine and fentanyl in laboring patients focusing on their differences in potency, side effects, and effectiveness. The findings could help healthcare providers make better pain management decisions and improve patient outcomes, addressing a gap in current research.⁷⁻⁹

METHODS

The study employed a quasi-experimental design conducted over a three-month period at Ghurki Trust Teaching Hospital in Lahore from 18th October 2024 to 17th January 2025 after approval from IRB & Ethical committee of LMDC, Ref no LMDC/L-ORIC-19. Non-probability convenient sampling was used to select laboring patients between the ages of 18 and 45, with singleton pregnancies in early active labor (cervical dilation of 3-4 cm). The sample size, calculated at a 5%

significance level and 80% power, included 34 participants (17 per group), based on anticipated Visual Analog Scale (VAS) pain scores at 30, 60, and 120 minutes for the morphine group (mean 2.52 ± 0.5) and fentanyl group (mean 3.00 ± 0.5). The dose of morphine used was 15 mg of morphine diluted in 15 ml N/S and 2.5 ml was administered in 5 minutes. The dose of fentanyl was 50 microgram diluted in 5 ml N/S and administered as bolus. The inclusion criteria were gestational age of 37-42 weeks, women in active labor, absence of significant pre-existing medical conditions, and both singleton and multiple pregnancies. Exclusion criteria included allergies to morphine or fentanyl, as well as medical conditions such as pre-eclampsia, diabetes, cardiovascular disease, and a history of substance abuse. After administering opioids, close monitoring of both the mother and newborn for adverse effects was implemented, with oxygen and naloxone available as safety measures. Data collection involved recording information for all patients presenting to the labor room with labor pain and admitted for planned labor induction.

RESULTS

The study compared the demographic and clinical characteristics of two groups receiving either morphine (Group A) or fentanyl (Group B) for labor pain management. Significant differences occurred in body mass index (BMI), the need for labor augmentation, and pain scores at 120 minutes post-medication. Group A had a significantly higher BMI ($M = 29.7$, $SD = 5.55$) compared to Group B ($M = 26.03$, $SD = 4.13$), with $p = .0361$. Moreover, labor augmentation was required more frequently in Group B, with 70.6% needing this intervention compared to 29.4% in Group A, a statistically significant difference ($p = .0164$).

Pain scores before medication and at 30 and 60 minutes post-medication did not significantly differ between the groups. However, at 120 minutes, Group B reported a significantly higher pain score ($M = 9.29$, $SD = 2.05$) than Group A ($M = 7.41$, $SD = 1.42$), with $p = .004$. These findings indicate that morphine can provide longer-lasting analgesia at 120 minutes compared to fentanyl.

No significant difference was observed in APGAR scores in both groups which means both drugs are safe to be used in labor for analgesia.

	Group A (Morphine) (N=17)	Group B (Fentanyl) (N=17)	P-Value
BMI (kg/m ²)	29.7±5.55	26.03±4.13	.0361
Labor			
Induced	7(41.2)	7(41.2)	1.000
Spontaneous	10(58.8)	10(58.8)	
Augmentation Needed			
Yes	5(29.4)	12(70.6)	.0164
No	12(70.6)	5(29.4)	
Pain Score			
Before Medication	8.35±1.22	9.18±1.88	.137
30 minutes	7.00±1.37	7.17±1.01	.683
60 minutes	7.24±1.52	7.65±0.93	.350
120 minutes	7.41±1.42	9.29±2.05	.004
APGAR score			
0 min	8.00	8.53	0.388
5 min	9.18	9.53	0.56

Table-I. Comparison of demographic and clinical characteristics between Group A (Morphine) and Group B (Fentanyl)

DISCUSSION

The study aimed to compare pain scores and side effects in laboring patients administered morphine or fentanyl for pain relief. Analysis of demographic and clinical characteristics demonstrated that patients receiving morphine (Group A) had a significantly higher BMI and required less labor augmentation than those receiving fentanyl (Group B).

The study showed no significant difference in pain scores between the two groups before medication and at 30 and 60 minutes post-administration. However, at 120 minutes, morphine maintained more effective analgesia, as evidenced by a significantly lower pain score (mean = 7.41) compared to fentanyl (mean = 9.29) ($p = .004$). These findings suggest that morphine may offer more sustained pain relief during labor but for the precise reason it may cause more sedation in mother and low APGAR scores in neonate.

Another study by Chen et al suggested no difference in pain score in either opioid, non-opioid and combination therapies.¹⁰

The frequency of side effects between the two groups varied, although this study did not detail specific adverse effects in each group. In a similar study by Smith and colleagues (2020), morphine was associated with more frequent nausea and sedation, while fentanyl's side effects included a transient decrease in fetal heart rate variability. The current study's findings of morphine's prolonged analgesic effect align with prior research, which indicates that morphine's slower elimination contributes to sustained relief but also correlates with a higher incidence of adverse effects.

Our study did not demonstrate a negative effect of either morphine or fentanyl on the APGAR score of the neonates. In comparison many other recent studies have investigated the effects of opioids used for labor analgesia on neonatal outcomes. Fentanyl administered intranasally or subcutaneously during labor resulted in low fetal exposure and did not adversely affect Apgar scores or require nursery admissions (Fleet et al., 2020).¹¹ However, intrapartum administration of morphine was associated with increased risk of 5-minute Apgar scores below 7 (Azar et al., 2024).¹²

These findings suggest that while some opioids may affect immediate post-birth outcomes, their long-term impact on neurodevelopment may be limited. Further research is needed to fully elucidate the effects of different opioids on neonatal outcomes.

In our study the onset of action of analgesia was quicker with fentanyl but the analgesic effect of morphine was long lasting and stayed till 120 min. In similar studies Intrathecal opioids are effective for labor analgesia, with fentanyl and morphine showing distinct advantages. Fentanyl provides faster onset of analgesia compared to sufentanil and morphine (Manouchehrian et al., 2020; Khaled & Sabry, 2020).^{13,14} However, morphine offers longer duration of analgesia and better pain management (Botea et al., 2023; Aslan

& Moraloğlu, 2020).

Morphine appears to provide longer-lasting pain relief compared to fentanyl, as evidenced by significant differences at 120 minutes. The need for labor augmentation was higher in the fentanyl group, which could reflect less effectiveness in supporting labor progression. Both medications were generally safe, with similar APGAR scores for neonates.

Morphine may be a better option for prolonged labor analgesia; however, individual patient characteristics (e.g., BMI) and labor dynamics should guide medication selection. Further studies could explore the pharmacological basis for these differences and assess maternal satisfaction and side effects.

CONCLUSION

This study aligns with recent literature in indicating that while fentanyl is useful for short-term pain relief, morphine provides longer-lasting analgesia, albeit with a potentially higher side effect profile. This information can assist clinicians in tailoring analgesic choice based on the duration and nature of labor.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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3	Shamsa Arshad Butt: Data collection.
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5	Sadaf Saddiq: Data analysis, interpretation.