

Efficacy Evaluation of Intravenous Infusion of Acetaminophen for Intrapartum Analgesia at a Tertiary Care Hospital

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ABSTRACT

Background: Labour is widely recognized as a significantly painful process, often necessitating the use of analgesia. Research comparing various painful medical conditions indicates that the average pain scores associated with labour in both primigravid and multigravida women exceed those reported for conditions such as sciatica, dental pain, or fractures. Hence, the present study conducted for efficacy evaluation of intravenous infusion of acetaminophen for intrapartum analgesia at a tertiary care hospital.

Materials & Methods: A total of 100 consecutive women in labour presenting for delivery having spontaneous onset of labour at term (37–42 weeks gestation) and in First stage of labour with cervical dilatation of 3–6 cm; were enrolled. Inclusion criteria included patients seeking analgesia. Cervical dilatation and demographic data, including age, gestational age, and body mass index, were recorded. All the participant was randomly allocated to either of the two Groups 1 or 2 with 50 patients in each group. Group 1 included cases which received a 100-mL intravenous infusion containing 1000 mg of acetaminophen while group 2 included controls who received an intravenous infusion of 100 mL of normal saline. Pain intensity was assessed on a scale of 0 to 10 with 0 indicating no pain and 10 indicating most severe unbearable pain. Outcome was evaluated and compared. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

Results: The mean age of the patients of group 1 and group 2 was 26.6 years and 25.1 years respectively. The mean gestational age of the patients of group 1 and group 2 was 39.5 weeks and 38.9 weeks respectively. Pain was significantly higher among control group at 1 hour and 2 hours after injection. The mean duration of labour among patients of group 1 and group 2 was 3.23 hours and 3.51 hours respectively.

Conclusion: Intravenous acetaminophen has been demonstrated to be an effective non-opioid analgesic for alleviating labor pain, exhibiting no adverse effects on either the mother or the fetus. Additionally, it has been shown to reduce the duration of labor. Furthermore, the observed impact of acetaminophen on labor duration is intriguing and warrants further investigation, as it may lead to a decreased occurrence of complications related to prolonged labor.

KEYWORDS: Acetaminophen, Analgesia, Intrapartum.

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INTRODUCTION

Labour is widely recognized as a significantly painful process, often necessitating the use of analgesia. Research comparing various painful medical conditions indicates that the average pain scores associated with labour in both primigravid and multigravida women exceed those reported for conditions such as sciatica,

dental pain, or fractures. The primary contributors to labour pain are believed to include cervical stretching during dilation, ischemia of the uterine muscle wall accompanied by lactate accumulation, and the stretching of the vagina and perineum during the second stage of labour.¹⁻³

The pain experienced during labour leads to a substantial increase in minute ventilation and oxygen consumption during contractions, which can result in severe respiratory alkalosis and a leftward shift in the maternal oxyhemoglobin dissociation curve, thereby reducing oxygen transfer to the fetus. Intervals of compensatory hypoventilation between contractions may lead to temporary maternal hypoxemia, which could, in turn, pose a risk of fetal hypoxemia. These episodes of hypoventilation may be further intensified by analgesic methods that induce respiratory depression, such as systemic opioid analgesia.⁴⁻⁶

Acetaminophen was initially introduced for clinical use in 1887; however, it did not gain widespread commercial availability in the United States until the mid-1950s. Since that time, it has emerged as one of the most commonly utilized and safest antipyretic and analgesic medications. The drug boasts a high therapeutic index, estimated at around 10, which reflects its favorable efficacy-to-safety ratio and its longstanding reputation as a reliable option for alleviating pain and reducing fever across diverse patient populations. This is especially relevant in hospital environments, where it can be effectively administered alongside other analgesics to enhance postoperative pain management.⁷⁻⁹ Hence; the present study was conducted for efficacy evaluation of intravenous infusion of acetaminophen for intrapartum analgesia at a tertiary care hospital.

MATERIALS & METHODS

A total of 100 consecutive women in labour presenting for delivery having spontaneous onset of labour at term (37–42 weeks gestation) and in First stage of labour with cervical dilatation of 3–6 cm; were enrolled. Cervical dilatation and demographic data, including age, gestational age, and body mass index, were recorded. All the participant was randomly allocated to either of the two Groups 1 or 2 with 50 patients in each group. Group 1 included cases which received a 100-mL intravenous infusion containing 1000 mg of acetaminophen while group 2 included controls who received an intravenous infusion of 100 mL of normal saline. Pain intensity was assessed on a scale of 0 to 10 with 0 indicating no pain and 10 indicating most severe unbearable pain. Outcome was evaluated and compared. All the results were recorded in Microsoft excel sheet and were subjected to statistical analysis using SPSS software.

RESULTS

The mean age of the patients of group 1 and group 2 was 26.6 years and 25.1 years respectively. The mean gestational age of the patients of group 1 and group 2 was 39.5 weeks and 38.9 weeks respectively. Pain was significantly higher among control groups at 1 hour and 2 hours after injection. The mean duration of labour among patients of group 1 and group 2 was 3.23 hours and 3.51 hours respectively.

Table 1: Demographic data

Variable	Group 1	Group 2
Mean age (years)	26.6	25.1
Mean gestational age (weeks)	39.5	38.9
Mean BMI (Kg/m ²)	23.6	24.1

Table 2: Comparison of pain by VAS

Pain	Group 1	Group 2	p-value
At injection	7.5	7.3	0.13
After 15 mins	6.8	6.9	0.28
After 1 hour	5.1	6.5	0.00*
After 2 hours	4.9	5.8	0.00*

*: Significant

Table 3: Duration of labour

Duration of labour	Group 1	Group 2
Mean	3.23 hours	3.51
SD	0.36	0.42
p-value	0.228	

DISCUSSION

Labor pain is recognized as one of the most intense forms of pain encountered by women. This pain significantly impacts maternal psychological well-being and the progression of labor, often resulting in feelings of apprehension, anxiety, and stress. The discomfort

experienced during the initial stage of labor primarily arises from cervical dilation and ischemia of the uterine muscle wall, which leads to the accumulation of lactate. As labor progresses into the late first stage and the second stage, additional pain is generated from the vagina and perineum. The resultant increase in

sympathetic nervous system activity can elevate oxygen consumption, resulting in respiratory alkalosis and metabolic acidosis, which may compromise oxygen delivery to the fetus. Consequently, effective pain management during labor is anticipated to alleviate maternal stress and enhance both maternal and perinatal outcomes. The field of obstetric analgesia and anesthesia has advanced significantly, transforming from a mere possibility into a practical reality. Non-pharmacological analgesic methods encompass emotional support, a calming birth environment, psychosomatic preparation, yoga, acupuncture, and transcutaneous electrical nerve stimulation.¹⁰⁻¹² Hence; the present study was conducted for efficacy evaluation of intravenous infusion of acetaminophen for intrapartum analgesia at a tertiary care hospital.

The mean age of the patients of group 1 and group 2 was 26.6 years and 25.1 years respectively. The mean gestational age of the patients of group 1 and group 2 was 39.5 weeks and 38.9 weeks respectively. Pain was significantly higher among control group at 1 hour and 2 hours after injection. The mean duration of labour among patients of group 1 and group 2 was 3.23 hours and 3.51 hours respectively. Dickinson JE et al determined if nulliparous women intending to have epidural analgesia have a similar labour profile and delivery outcome to women who intend to have their labour managed using alternative forms of pain relief. A prospective randomised controlled clinical trial conducted at a tertiary obstetric institution. Nulliparous women intending to deliver vaginally with a term singleton fetus were eligible for recruitment. 1159 women were recruited, of whom 992 were subsequently randomised to receive continuous midwifery support (CMS) or epidural analgesia (EPI) on presentation for delivery. The duration of labour was shorter in the CMS group compared with EPI (10.7 hours (inter quartile (IQ) 7.0,15.2) versus 11.4 hours (IQ 8.2,15.2), $p = 0.039$). The median duration of the first stage was 8.9 hours (IQ 6,12.5) versus 9.5 hours (IQ 7,12.7) ($p = 0.069$), and the median duration of the second stage was 1.33 hours (IQ 0.6,2.5) versus 1.48 hours (IQ 0.77,2.6) ($p = 0.034$). The requirement for oxytocin augmentation in spontaneous labour was 39.8% CMS versus 46.2% EPI ($p = 0.129$). There was no significant difference in the caesarean section rates. The need for any operative delivery was significantly lower in CMS. Nulliparous women have a high usage of epidural analgesia, regardless of their prelabour intentions. In women who do not intend to use epidural analgesia, the temporal delay in insertion compared with those who use epidural analgesia as their primary analgesic modality is associated with a small but statistically significant reduction in overall labour duration and operative delivery rates.¹⁰ Abd-El-Maeboud KHI et al evaluated the efficacy and adverse effects of an i.v. infusion of paracetamol during the active phase of

labor as compared with sterile water (placebo) as a method for intrapartum analgesia. 120 low-risk primiparous women presenting in active labor, were allocated to receive either 1000 mg i.v. of paracetamol ($n = 60$) or sterile water ($n = 60$). The primary outcomes were the efficacy of the drug to supply adequate analgesia as measured by a change in the visual analog scale (VAS) pain intensity score at various time points after drug administration and the need for additional rescue analgesia. The secondary outcomes included the presence of adverse maternal or fetal events. Compared to controls, i.v. infusion of paracetamol was associated with significantly lower VAS score 15 and 30 min after the start of medication; also, there was a significantly lower incidence of need for rescue medication (8/57 [14%] vs 49/59 [83.1%], $P < 0.001$) at 60 min after the start of medication. There were no recorded maternal adverse effects in either group. There were no differences in the occurrence of intrapartum fetal distress or neonatal Apgar scores between both groups. Paracetamol appears to be a safe and effective medicine that can be used during the intrapartum period.¹¹

CONCLUSION

Intravenous acetaminophen has been demonstrated to be an effective non-opioid analgesic for alleviating labor pain, exhibiting no adverse effects on either the mother or the fetus. Additionally, it has been shown to reduce the duration of labor. Nevertheless, it is advisable to conduct larger comparative studies between acetaminophen infusion and opioid analgesics to validate these results. Furthermore, the observed impact of acetaminophen on labor duration is intriguing and warrants further investigation, as it may lead to a decreased occurrence of complications related to prolonged labor.

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