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Study on Efficacy of Entonox-In Labour Pain Management, Its Maternal Complications and Fetal Outcome

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Abstract: Background: Entonox is a pre-mixed pain relieving gas of 50%nitrous oxide and 50%oxygen. Entonox is delivered to the patients easily via inhalation which is non-invasive, patient-controlled, safe and on demand basis. **Objective:** The aim is to evaluate analgesic effect of Entonox on labour pains and its maternal complications and fetal outcome. **Methodology:** It is case control study in 100 parturients over a period of 1 month in KGH, Visakhapatnam. 50 were taken as cases and given Entonox, 50 were taken as control. Entonox gas inhalation given at active phase of labour up to 10cms dilatation. Pain using Visual analogue scale, mode of delivery and side effects were analysed. **Result:** In both groups pain severity based on VAS, mode of delivery, occurrence of postpartum bleeding and neonatal Apgar scores studied and compared. **Conclusion:** Entonox is more effective to reduce pain during labour. Entonox is cheap, safe, and easily available for pain relieving labour. It has no severe side effects on mother and neonate.
Keywords: Entonox, Nitrous oxide, Labour pains, Vaginal delivery.

Introduction

Labour pain is one of the most severe and intolerable pain a woman experiences in her life time. Most of the women describe the pain as either severe and intolerable pain. Several routes for labour analgesia had been investigated like intravenous, regional, inhalational therapy, acupuncture, and local anaesthesia. Of these Entonox is analgesic inhalational gas which is a premixed homogenous gas mixture of 50% nitrous oxide and 50% oxygen compressed in a cylinder. It was used all over Asia and Europe in last 50 years. It was introduced for labour analgesia in early 60's in United Kingdom and commercially it was accepted by Central Midwives Board UK in 1965. Nitrous oxide commonly used as labour analgesia in Australia and New-Zealand[1].

Entonox is an ideal choice for obstetrics analgesia as labour pains during uterine contractions are intermittent. It can be inhaled accordingly to synchronise with the uterine contractions. It was well proven safe and effective analgesia for obstetrics use due to its ideal properties of rapid onset, short half-life, and rapid recovery when discontinued. Side effects are minimal, transient and immediately disappear once Entonox inhalation discontinued and less affected on mother and neonate[5]. Recent studies have clarified the analgesic mechanism of nitrous oxide but the mechanisms involved in its anxiolytic and anesthetic actions remains less clear. The analgesic effect of nitrous oxide is Opioid in

nature like morphine, may involve a myriad of neuromodulators in the spinal cord. On other hand the anxiolytic effect of Nitrous oxide resembles that of benzodiazepines and may be initiated at selected subunits of the Gamma-amino butyric acid type-A (GABA-A) receptor.

Similarly the anesthetic effects of Nitrous oxide may involve GABA-A receptors and N-methyl-D-aspartate receptors as well[6]. A critical aspect of Entonox is women can use the gas by herself when and how much she requires. A part of the effectiveness may rest in the woman's sense of being able to control not only the nitrous oxide but also the pain and herself[7].

Therefore, we aimed to evaluate the effect of Entonox on severity of labour pain during delivery stages.

Aims and Objectives

- ✓ To evaluate the analgesic effect of Entonox on labour pain relief and its maternal complications and fetal outcome.

The following objectives were assessed

- ✓ Pain severity based on VAS (visual analogue scale)
- ✓ Mode of delivery
- ✓ Duration of active phase of labor
- ✓ Amount of post-partum blood loss
- ✓ Neonatal Apgar scores
- ✓ Side effects of Entonox like lethargy, dry mouth, vomiting, and vertigo.

Methodology

Study Design and Location

It was a case control study done in 100 parturients over a period of 1 month in department of obstetrics and gynaecology, King george hospital, Andhra medical college, Visakhapatnam, Andhra Pradesh.

Materials and Methods

100 women of term pregnancy between 37^{+1} to 41^{+6} weeks were taken and divided randomly in to 2 groups. 50 were cases given Entonox and 50 were controls breathes room air. Informed consent was taken from both groups. The indication for Entonox administration in trail group was cervical dilation at 3to 4cm. Women were advised to inhale Entonox in synchronization with uterine contractions and continued to the end of the contraction pain at which patient breathed room air. Encouraged bearing down effects after full dilatation.

Inclusion Criteria

Parturients with (a) singleton, (b) cephalic, (c) gestational age 37^{+1} to 41^{+6} weeks.

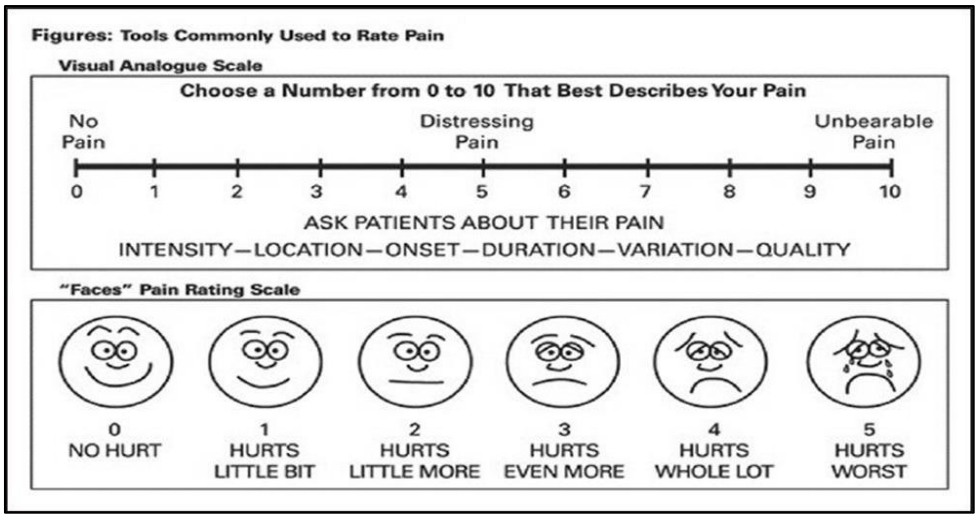
Exclusion Criteria

Parturients with (1) Medical disorders like (a) hypertension, (b) diabetes, (c) respiratory diseases, (2) Intra uterine deaths, (3) Multiple pregnancy, (4) oligohydramnios AFI <5cm and polyhydramnios AFI>22cm.

Visual Analogue Scale (VAS)

VAS score is widely used to measure pain intensity. It is subjective measure for pain. Scores are recorded by making a handwritten mark on a 10cm line that represents a continuum between mild pain and severe pain.

0-3: No-mild pain
4-7: Moderate pain
8-10: Severe pain



Statistical Analysis

Data was analysed with appropriate statistical methods. The entire test was 2 sided significant at the level of 0.05 by estimating power of 95%. Normality test was performed and all variables were normally distributed. Descriptive analysis was performed to descript characteristics of subjects. To compare mean of two normal continuous variable independent samples T-test was conducted.

Results

Table 1. Parity

	Cases(50)	Controls (50)
Primi (80%)	40	40
G2 (16%)	8	8
G3 (4%)	2	2

In both groups equal number of cases and controls were taken, i.e. 80% were primi para,16% were G2, 4% were G3.

Table 2. Mode of delivery

Mode	Normal Deliveries	Outlet Forceps	C-Sections
Cases	43(86%)	4(8%)	3(6%)
Controls	43(86%)	4(8%)	3(6%)

In trail group 6% had c-sections for non-descend of fetal head. In control group 6% had c-sections, for meconium stained liquor with fetal distress and non-descend of fetal head. There was no difference in mode of delivery in both case and control groups.

Table 3. Mean duration of active stage of labour

Primi	4hrs	5hrs	6hrs	7hrs	8hrs
Cases (38)	4	12	11	7	4
Controls (38)	3	12	10	8	5
G2					
Cases (7)	4	3	-	-	-
Controls (7)	3	4	-	-	-
G3					
Cases (2)	2	-	-	-	-
Controls (2)	2	-	-	-	-

Duration of active phase of labour in both the groups were compared in primipara, in G2 and in G3, statistically there was no much difference observed.

Table 4. Pain severity based on VAS

VAS	No-Mild Pain Score 0-3	Moderate Pain Score 4-7	Severe Pain Score 8-10
Cases	40(80%) Primi-32 G2-6 G3-2	10(20%) Primi-8 G2-2 G3-0	0
Controls	0	5(10%) Primi-0 G2-3 G3-2	45(90%) Primi-40 G2-5 G3-0

Mean severity of pain during uterine contractions was 5.1±1.29 in case group compared with the control group 8.99±1.98.The association was significant ($p<0.002$).

Table 5. Neonatal apgar scores

Apgar	Cases	Controls
8-10	47(94%)	48(96%)
6-8	3(6%)	2(4%)
SNCU admissions	3(6%)	2(4%)
Neonatal deaths	0	0

There was no much difference in neonatal apgar scores in both trail and control group.

Table 6. Side effects of Entonox

Side Effects	Percentages
Vomiting	5(10%)
Dry Mouth	30(60%) Most common
Lethargy	5(10%)
Vertigo	0

Side effects of Entonox like dry mouth is seen in 60%, followed by vomiting and lethargy and all side effects are transient.

Discussion

This study was demonstrated the effect of Entonox for analgesia and pain relief during labor. Entonox (50% nitrous oxide in oxygen) was safe and effective labor analgesia. There are no severe side effects in both mother and neonate. The present study showed that the intensity of labor pain in Entonox group was significantly lower than controls. This result was comparable with the study of Teimoori et al. in 2011 that showed pain severity according to VAS was significantly lower in mothers received Entonox ($P=0.0001$)[2]. Another study also supported our results that the mean labor pain intensity was decreased significantly after inhaled Entonox compared with control groups (4.17 vs 6.78, $p<0.01$)[3].

In the present study there is no difference in mean duration of active phase of labour in both groups. This result was comparable with the study of Iravani[3] reported that there was no significant difference in mean duration of active phase of labor and also in duration of second stage of labor between Entonox and control group (33.19min vs 26.70min)[3]. Despite these findings, some studies showed that active phase of labor in the Entonox group was shorter than control group (4.1hr in

entonox vs 5.07hr control group reported by Zare Tazarjani et al.[4]. In this study pulse rate, blood pressure and oxygen saturation of mothers were not altered. No effect on amount of postpartum blood loss. Side effects are minimal and transient. Because the half-life of nitrous oxide is short (approx.5mins) there is no evidence on absorption of drug by mother and infant. So, no waiting period for initiation of breast milk or discarding of milk is required.

Some evidence indicates that primiparous mothers who inhaled Entonox during labor for analgesia had better and early initiation of breast feeding than mothers who do not. Despite the availability of various methods to reduce the child birth pain, Entonox is most widely accepted due to:

- ✓ Rapid elimination from the body, excreted mainly unchanged (i.e unmetabolized) via lungs.
- ✓ Less expensive
- ✓ Generalised well-being and satisfaction of mother,
- ✓ Less need of specialized equipment.
- ✓ Although the administration should be under trained midwives.

Conclusion

Entonox is safe, cheap and easily available gas for labor analgesia. Significantly reduces pain severity during labor without affecting duration of first and second stage of labour, maternal vitals, cesarean section rates.

Conflicts of interest

The authors declare that there are no conflicts of interest.

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