

Pain relief in labor – tramadol versus pentazocine

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OBJECTIVE(S) : To assess the efficacy and safety of intramuscular tramadol hydrochloride as an analgesic during labor compared to those of pentazocine.

METHOD(S): The study was conducted on 200 primigravidas and second gravidas in labor at term. They were alternately divided into two groups. The study group (n=100), received 100 mg of tramadol and the control group (n=100) received 30 mg of pentazocine intramuscularly at the onset of active labor. Maternal cardiovascular parameters, side effects, degree of analgesia and progress of labor were noted.

RESULTS : Pain relief was satisfactory in 37% vs 14% (P<0.002), moderate 38% vs 34% (P=0.63) and mild 16% vs 42% (P<0.006) in the tramadol and pentazocine groups respectively. Injection delivery interval was significantly shorter in the tramadol group, being only 3 hours 17 minutes \pm 2 hours 5 minutes vs 4 hours 21 minutes \pm 2 hours 6 minutes in the pentazocine group (P=0.002). Side effects were significantly less in the study group (18% vs 40%; (P=<0.001).

CONCLUSION(S) : Tramadol is an effective and safe labor analgesic, producing moderate to satisfactory analgesia. Besides it also significantly shortens the duration of labor (P<0.05).

Key words : tramadol, labor analgesia

Introduction

Pain and agony during childbirth is quite often unbearable and at times beyond description. This pain if not adequately controlled can lead to maternal and fetal sequelae because of widespread maternal sympathetic activation that causes increase in cardiac output, blood pressure, and pulse rate of the mother. Effective analgesia prevents the pain induced hyperventilation and hypocapnia which can be severe enough to produce tetany in painful labor. Painful labor also reduces uteroplacental blood flow by up to 25%.

The requirements of a satisfactory analgesic in labor are safety and effective analgesia throughout the painful periods of

labor with no unpleasant maternal side effects and no depressant effect on the baby or on the maternal cardiorespiratory system.

Tramadol is a central analgesic belonging to the group of last generation synthetic opioid analgesic with low affinity for opioid receptors. Pentazocine is a benzomorphan derivative with both agonistic and weak opioid antagonistic activity. This study assesses the efficacy and safety of both these drugs as labor analgesia.

Methods

Two hundred primigravidas and second gravidas were selected randomly with pregnancy of gestational age between 37 to 42 weeks with a single fetus in cephalic presentation without evidence of cephalopelvic disproportion. Women with a history of respiratory disease, chronic hypertension, heart disease, epilepsy, or psychiatric disorders were excluded from the study. The 200 women were alternately divided into :

Group A – Study Group : 100 women in active labor who received 100 mg tramadol intramuscularly.

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Group B – Control Group : 100 women in active labor who received 300mg pentazocine intramuscularly.

Active labor was defined as dilatation of cervix ≥ 3 cm with one uterine contraction every 3 minutes, each lasting 30 seconds or more. Repeat dose of 50mg tramadol or 15 mg pentazocine was injected intramuscularly after 4 hours except in cases where the women had reached the end of 1st stage or entered 2nd stage of labor. The following points were noted – time of onset of pain relief, degree of analgesia, and side effects. Fetal heart rate and maternal cardiorespiratory parameters and progress of labor were monitored at half hourly intervals. Mode of delivery,

duration of the three stages of labor, and apgar scores of the baby at birth, at 1 minute and at 5 minutes were observed. Mother's condition was noted 24 hours after delivery and at the time of discharge.

Results

The two groups were matched for age, gravidity, and gestational age. The mean age of the women was 23.15 ± 3.94 years and 22.94 ± 3.37 years in Group A and B respectively. The mean gestational age was 39.06 ± 1.35 weeks and 39.17 ± 1.19 weeks in Group A and B respectively.

Table 1. Maternal cardiorespiratory parameters.

	Group A (Tramadol) Mean \pm SD	Group B (Pentazocine) Mean \pm SD	P value
Fetal heart rate			
At onset of labor	141.58 \pm 5.36	140.5 \pm 4.34	0.94
At the time of inj.	140.32 \pm 5.21	140.6 \pm 5.06	1.0
30 minutes after injection	140.24 \pm 4.82	140.0 \pm 4.55	1.0
Maternal pulse rate			
At the time of injection	87.29 \pm 7.25	86.96 \pm 7.91	0.97
30 minutes after injection	87.62 \pm 4.81	87.14 \pm 6.15	0.97
After delivery	88.40 \pm 4.54	87.98 \pm 5.78	0.97
Maternal Respiration			
At the time of injection	17.30 \pm 2.50	17.64 \pm 1.86	0.95
30 minutes after injection	17.88 \pm 2.78	18.42 \pm 2.15	0.92
After delivery	17.72 \pm 2.92	18.34 \pm 2.28	0.91
Maternal blood pressure			
At the time of injection			
Systolic	121.18 \pm 11.48	120.70 \pm 10.16	0.97
Diastolic	82.2 \pm 8.63	81.08 \pm 7.18	0.92
30 minutes after injection			
Systolic	120.50 \pm 10.80	120.30 \pm 9.63	1.0
Diastolic	81.75 \pm 6.76	80.52 \pm 7.53	0.92
After delivery			
Systolic	119.64 \pm 9.79	120.70 \pm 10.32	0.94
Diastolic	79.92 \pm 5.93	81.10 \pm 6.96	0.92

There was no statistically significant difference in any of the parameters in the two groups.

Effect on fetal heart rate and maternal cardiorespiratory parameters

No statistically significant changes in the fetal heart rate, and maternal cardiorespiratory parameters were noted at the time of injection and 30 minutes after the injection in both the groups (Table 1).

Time required for onset of action

There was no statistically significant difference in the time required for the onset of the action of tramadol (15.89 ± 6.61 minutes) and that of pentazocine (16.26 ± 7.01 minutes) ($P=0.94$) (Table 2).

Table 2. Time required for the onset of action of analgesia.

Time (Minutes)	Group A Tramadol	Group B Pentazocine
5-10	10	7
11-15	35	30
16-20	38	43
21-25	4	6
26-30	4	4
Mean ± SD	15.89 ± 6.61 ^a	16.26 ± 7.01 ^a

^a P = 0.94. Nine in Group A and 10 in group B and no pain relief.

Table 3. Degree of analgesia.

Degree of analgesia	Group A Tramadol (n=100)	Group B Pentazocine (n=100)	P value
Satisfactory	37	14	< 0.002 ^a
Moderate	38	34	0.63
Mild	16	42	0.006 ^a
Nil	9	10	0.81

^a Significant

Degree of analgesia achieved

Significantly more number of the women experienced satisfactory analgesia in the tramadol group viz., 37% as compared to only 14% in the pentazocine group (P<0.002). Thirty-eight percent in the tramadol group and 34% in the pentazocine group (P=0.63) experienced moderate analgesia, while 42% of the Pentazocine group had mild analgesia as compared to 16% in the tramadol group, (P=0.006). Nine percent in the tramadol group and 10% in the pentazocine

Table 4. Side effects.

Side effects	Tramadol (n=100)	Pentazocine (n=100)	P value
No side effect	82	60	<0.001 ^a
Some side effect	18	40	<0.001 ^a
Nausea	11	24	0.027 ^a
Vomiting	4	16	0.07
Dry mouth	10	14	0.41
Palpitation	1	4	0.17
Drowsiness	1	12	0.002 ^a

^a Significant

Table 5. Duration of stages of labor, and interval between injection and delivery.

	Tramadol (Hours : Minutes) Mean ± SD	Pentazocine (Hours : Minutes) Mean ± SD	P value
First stage	4:28 ± 2:22	5:16 ± 2:47	0.047
Second stage	0:30 ± 0:05	0:42 ± 0:58	0.157
Third stage	0:04 ± 0:015	0:04 ± 0:015	1.0
Interval between injection and delivery	3:17 ± 2:05	4:21 ± 2:62	0.002 ^a

^a significant

group had no pain relief. (Table 3). Thirteen percent in the pentazocine group as compared to only 6% in the tramadol group required second dose of injection.

Side effects

Significantly more women in the pentazocine group had side effects compared to those in the tramadol group (40% vs 18%; P<0.001). (Table 4).

Effect on progression of labor

The total duration of labor was significantly less in the tramadol group as compared to that in the pentazocin group (P<0.05). The average duration of the three stages of labor and interval between injection and delivery are given in Table 5.

Mode of delivery : Majority of the cases in both the groups had normal vaginal delivery (93% in Group A and 90% in Group B). Four vs eight delivered by forceps and three vs two required cesarean section in Group A and B respectively.

Neonatal outcome

Ninety-eight percent in the tramadol group and 90% (P=0.017) in the pentazocine group had one minute apgar score above 7. Fourteen babies of the pentazocine group as against four of the tramadol group required admission in nursery for a day or two.

Discussion

Majority of women were in the age group 21 to 25 years and there was no statistically significant difference in the two groups regarding gravidity or gestational age. In the study by Jain et al ¹ and by et al Li and Weng L ² all women were primigravidas. In the study by Bajaj ³ all 100 women were in the gestational age of 37 to 42 weeks.

No significant changes in the fetal heart rate pattern or maternal cardiorespiratory parameters were noted with any of the two analgesics. Keskin et al ⁴ and Li and Weng ² also

did not observe and change in fetal heart rate. Li and Weng² and Bajaj et al³ did not note any change in maternal cardio-respiratory parameters.

We used a four-point rating system to judge pain relief, 0-no response, 1-mild response, 2-moderate response, 3-satisfactory response. Viegas et al⁵ measured pain relief by a four-point verbal rating scale and their score was 0.9 with tramadol 50 mg, 1.7 with tramadol 100 mg and 1.7 with pethidine 75 mg. Li and Weng² observed that effective pain relief with tramadol was seen in 67% ad with dihydroetorphine hydrochloride in 63%. Bajaj et al³ noted that mean pain relief was 38.92% with tramadol. Our study showed statistically significant difference in the degree of analgesia between the two groups as shown in Table 3, with tramadol being a better analgesic. Side effects such as nausea, vomiting, dryness of mouth, and drowsiness were statistically significantly more in the pentazocine group. (P<0.001, Table 4). Jain et al¹ observed that sedation was the only side effect in 9% of tramadol group.

A good analgesic will reduce the duration of labor and prevent dysfunctional labors. In our study the mean duration of 1st stage of labor in the tramadol group was lower that that in the pentazoncine group (P=0.47, Table 5). Ninety-four percent in the tramadol group and 82% (P=0.009) in the pentazocine group delivered within 6 hours of injecting the analgesic. Significantly more number of women in the tramadol group delivered within 4 hours (70%, vs 55%; P=0.002). Suvonnakote et al⁶ also observed that with equianalgesic doses there was a strikingly rapid progression of labor in most patients receiving tramadol.

Normal vaginal delivery, outlet forceps application, and cesarean sections were 93%, 4% and 3% in the tramadol and 90%, 8% and 2% in the pentazocine group respectively. group Li and Weng² observed that there was higher rate of operative intervention (forceps or cesarean section) in those

receiving dihydroetorphine hydrochloride compared to the controls but the difference was not significant.

Associated factors and transplacental transmission of the analgesic from mother to fetus can affect the apgar scores of the babies at birth. Ideal analgesic is the one that has no adverse effect on the fetus. In our study apgar scores of the babies at birth were satisfactory and although four babies in the tramadol and 14 babies in the pentazocine group were admitted in the nursery, they all were discharged within 48 hours. Suvonnakote et al⁶ and Viegas et al⁵ noted that tramadol has a distinctly lower respiratory depressant effect on the neonate than pethidine. The 3rd stage blood loss was average in our study. Li and Weng² observed a higher average amount of postpartum hemorrhage in the dihydroetorphine hydrochloride group as compared with that in the control group but the difference was not significant.

Conclusion

Tramadol gives better pain relief, shortens the labor and is safe for the mother and the baby.

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