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EFFECTIVENESSOF LABOUR ANALGESIA WITH LOW DOSE OF KETAMINE- A COMPARATIVE STUDY

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ABSTRACT

INTRODUCTION: Labour is always connected with a painful experience even though it's a natural physiological process. Ketamine originally called as CI 581 was first synthesized by Calvin Stevens in 1962 and was found to provide adequate analgesia even at sub anesthetic dose. The present study was designed to compare the efficacy of low dose ketamine versus placebo in providing adequate analgesia during labour.

MATERIAL AND METHODS: This study was a hospital based comparative study which was conducted in the labour room in the Department of Obstetrics and Gynaecology at Aarupadai Veedu medical college and hospital, Puducherry. Totally 60 participants were enrolled in the study,30 in each group the interventional group was administered low dopse of ketamine with loading dose 0.2mg/kg followed by 0.1 mg/kgas maintenance dose as infusion while controlled group was administerd saline infusion. The data was analysed using SPSS software P value less then 0.05 consider as statistically significant.

RESULT: In our study the pain relief was excellent in study group. The mean pain score during delivery among patients in ketamine group was comparatively lower when compared to placebo group showing statistical significance with $p<0.001$ at 1hr,2hr,3hr,4hr and 5hr respectively. The satisfaction score among patients among ketamine and placebo group was found to be significant with $p<0.010$

CONCLUSION: It provides effective analgesia in low dose and does not cause respiratory depression. Intravenous ketamine in low dose appears to be safe alternative to epidural analgesia and had no complications to mother and fetus.

Keywords: Ketamine; Low Dose; Pain Relief

INTRODUCTION

The transformation from womanhood to motherhood is well appreciated when a woman gives birth which is considered as a vital event in every women life. Both motherhood and pain have been observed to be inseparable, since labour pain is considered as an outcome of complex interactions both physiological and psychological which employs excitatory as well as inhibitory effects. Woman

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experiences pain during all stages of the labour and its severity is directly proportional to the duration and intensity of uterine contractions. Intolerable painful labour can lead to elevated blood pressure, compensatory metabolic acidosis, hormonal imbalance, maternal hyperventilation and respiratory alkalosis.[1] Ketamine originally called as CI 581 was first synthesized at the Park Devis Lab by Calvin Stevens in 1962. It is N-Methyl-D-aspartate receptor antagonist which is readily available and has been put into use to provide for minor procedures by non-anesthesiologist.[2]

Studies have indicated that ketamine exerts its analgesic property through N-Methyl-D-aspartate receptor hence systemic administration does not induce respiratory depression which is considered as an advantage over narcotics and thus founds its utility in obstetrics in providing analgesia during labour in intermittent boluses.[3,4]Ketamine has been found to have the minimal suppressive effects on the fetus. Its potentiality to increase the maternal blood pressure and uterine blood flow has been beneficial in improving uterine perfusion for babies delivered shortly with low dose ketamine.[5] Moreover there was no deleterious effect on APGAR score when administered at low dose of 2mg/kg during labour analgesia.[6,7]In developing countries like India adequate analgesia during labour and delivery is inadequate, the reason being the in availability of constant supply of opioid analgesics and its dreaded complication of respiratory depression both to mother and neonate. Therefore the present study is aimed to compare the efficacy and safety of low dose ketamine versus placebo in providing adequate analgesia during labour .

METHODS

Study design: After obtaining ethical approval from institutional ethical committee, a hospital based observational study was conducted in Department of Obstetrics and Gynecology, AarupadaiVeedu medical college and hospital,Puducherry from February 2021 to June 2022 Study groups: Control group (saline infusion) and case group (intravenous lower dose ketamine).ASA Status I& II, female is in the age group from 18 to 30, adequate Gynaecoid pelvis, cervical dilatation 3 to 4 cm and single term pregnancy were included .Patients refusal, patient with pregnancy induced hypertension, heart disease, anemia and other complications of pregnancy, bleeding and coagulation disorders, drug allergy, previous LSCS, abnormal presentation, twin pregnancy, severe anemia (Hb % less than7.0gm) were included

Patients were divided into study and control group. Each group consist of 30 patients each according to the inclusion criteria. The patients in the study group started with loading dose 0.2 mg/kg body weight followed by maintaining dose 0.1mg/kg/hr as infusion. Parameters like patient consciousness, orientation, systolic blood pressure, diastolic blood pressure, heart rate, fetal heart rate, respiratory rate were recorded at regular intervals. Uterine contraction and fetal heart were monitored. In the control group, all the patients received placebo (saline water) and the same parameters were checked in the same manner as study group. The patients were asked to rate their overall quality of analgesia using visual analog scale.

Data were collected in excel. Categorical variables were summarized as frequency and percentage. Continuous variables were summarized as mean ± standard deviation. Independent student t test was used to compare the continuous variables and chi-square test the categorical variables was compared between the groups. The p value less than 0.05 was considered as statistically significant in all the statistical tests. The data were analysed using the Statistical Package for Social Sciences (SPSS version

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28).

RESULT

In the present studythe mean age of the patients in the ketamine group was 26.83±4.85 and in placebo group was 29.07±5.04. In the present study 19 women were primigravida and 11 women were multigravida in ketamine group whereas 14 women were primigravida and 16 women were multigravida in placebo group. Comparing the gestational age between the groups, 24 women were in their term in ketamine group whereas only 12 women in placebo group.

Figure 1 : Distribution of patients according to age

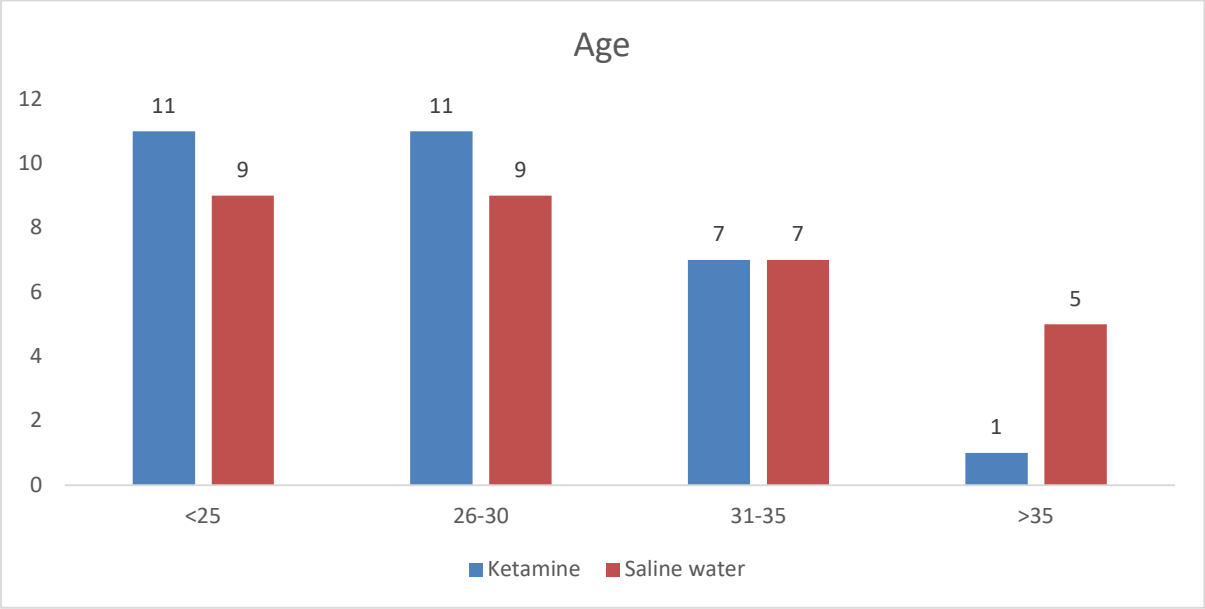

Table 1 : Side effects between the interventional and control group

Side effects		Group		Chi-square value	P value
		Ketamine	Saline water		
Vomiting	No	28	24	2.308	0.129
	Yes	2	6		
Hallucinations	No	24	21	0.8	0.371
	Yes	6	9		

Table 2 : Comparison of pain scores between the interventional and control groups

Group		N	Mean	Std. Deviation	T value	P value
Pain_score_base	Ketamine	30	9.50	0.63	0.737	0.232
	Saline water	30	9.37	0.76		
Pain_score_1hr	Ketamine	30	6.67	1.52	5.392	<0.001*
	Saline water	30	8.57	1.19		

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Pain_score_2hr	Ketamine	30	5.07	1.93	8.496	<0.001*
	Saline water	30	8.47	1.04		
Pain_score_3hr	Ketamine	30	4.77	1.41	11.739	<0.001*
	Saline water	30	8.67	1.15		
Pain_score_4hr	Ketamine	30	4.57	1.55	12.215	<0.001*
	Saline water	30	8.73	1.05		
Pain_score_5hr	Ketamine	30	5.00	2.23	8.363	<0.001*

The mean pain score during delivery among patients in ketamine group was comparatively lower when compared to placebo group showing statistical significance with p<0.001 at 1hr,2hr,3hr,4hr and 5hr respectively.

Table 3 : Sedation score between the interventional and control group at hourly monitoring

		Group		Chi-square value	P value
		Ketamine	Saline water		
Sedation base	Awake	5	1	2.963	0.227
	Responds to verbal call	13	15		
	Responds to tactile stimulus	12	14		
sedation_1hr	Awake	11	9	7.8	0.020*
	Responds to verbal call	18	12		
	Responds to tactile stimulus	1	9		
sedation_2hr	Awake	12	6	12.5	0.002*
	Responds to verbal call	18	14		
	Responds to tactile stimulus	0	10		
sedation_3hr	Awake	22	10	13.3	0.001*
	Responds to verbal call	8	12		
	Responds to tactile stimulus	0	8		
sedation_4hr	Awake	20	10	15.38	<0.001*
	Responds to verbal call	9	8		
	Responds to tactile stimulus	0	12		
sedation_5hr	Awake	22	8	19.592	<0.001*

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	Responds to verbal call	8	9		
	Responds to tactile stimulus	0	13		

Table 4 : Satisfaction score between the interventional and control group

		Group		Chi-square value	P value
		Ketamine	Saline water		
	0-4	2	0		
	4-8	22	30		
Satisfaction score	>8	6	0	9.231	0.010*

The satisfaction score among patients among ketamine and placebo group was found to be significant with $p<0.010$

DISCUSSION

In present study, loading dose of ketamine was 0.2 mg/kg and maintenance dose was 0.1mg/kg. In the present study the mean pain score during delivery among patients in the ketamine group was comparatively lower when compared to the placebo group showing statistical significance when observed at hourly duration delivery proving that ketamine infusion at low doses provided better analgesic effect in managing labour pain.

Ganla KN et al[3]in their study found that nearly 70% of the patients did not complain of pain completely. Study conducted by Shabina Khan et al[8] concluded that the degree of pain relief was found to be excellent with nearly 80% of patients and remaining 20% of patients found pain management to be satisfactory which was statistically significant. Nearly 10% of the patients experienced vomiting and nausea and other side effects like tachycardia and raise in blood pressure. In the present study pain management was statistically significant compared to the placebo group with only fewer side effects like vomiting and nausea compared to the placebo group.

Daftary et al[9] concluded the 70% of patients had pain relief during labour which is in concordance with the present study results where study group had better pain relief of about 73% compared to placebo group. Further study done by Anim-Somuahet al[10] evaluated that low dose ketamine administration is safer and very simple and effective.Havle PA et al[11] concluded that low dose ketamine was found to very effective in providing painless delivery among 83.57% of their study participants.Kavitaet al[12]results showed that pain relief satisfaction was around 77.90%

Joselyn et al[13] concluded from their clinical trial that nearly 60% of women in the ketamine group had significant pain relief and was statistically significant. This result is similar to the present study where the pain score was statistically significant in the first hour of ketamine administration.Krishna Jagatia et al[14] in their randomized controlled trial which included 100 parturients found out that 90% of cases had excellent pain relief and 8% had satisfactory pain relief while 2% did not experience pain all which

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compared to the present study achieved highest percentage of pain relief to the patient.

CONCLUSION

Observations from this study have promising results in managing pain during labour at low dose ketamine infusion. Patient's pain score was found to be satisfactory at hourly monitoring which emphasis on the fact that low dose ketamine has the potential to reduce pain during labour. Ketamine has proved to be safe in administration without any complications to maternal and fetus. Complications were only minimal in most of the literatures dealing with the drug ketamine at low doses which was the similar in this study. Ketamine has proved to be easy for administration which does not warrant for any expertise and was found to be cost effective compared with other drugs used at present for management of labour pain. On the whole low dose ketamine used for management of labour pain was found to be safe, easy to administer, cost effective, potential in reducing pain without much complication to mother and fetus.

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