

# Study of Fetomaternal Outcome of Labor Analgesia by Epidural Technique

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## Abstract

Currently labor patients are demanding a more comfortable experience, which has raised need for incorporating Epidural Analgesia into more common practice. In this technique local anaesthetic agent is injected into lower spine achieving central nerve blockade. **Objective:** To control labor pain popular method is epidural administration of opioids with local anaesthetic agent. **Design:** This was a Prospective Interventional type of study which was conducted at labor room on 25 patients after written and informed consent. **Subjects:** The study was conducted in the Department of Obstetrics and Gynaecology, B.J. Medical College, Civil Hospital, from June 2018 to June 2020. **Methods:** We selected epidural administration of Local anaesthetic + Opioids – 0.1%Bupivacaine + 20 microgram Fentanyl. **Results:** Our study shows excellent VAS score with scores in multigravida better than in primigravida and in first stage of labour better than in 2nd stage. It was very evident that epidural analgesia is effective with high level of patients' satisfaction. **Conclusion:** Epidural analgesia is very safe and effective method for labour analgesia, with excellent analgesic sensory effect with negligible motor effect on labour without having any undesired effects on fetomaternal outcome such as prolongation of duration of labor, or an increase in instrumental and cesarean delivery. By comparing pain score it was very evident that epidural analgesia is one of the best modalities in labour analgesia.

**Keywords:** Epidural technique, Fetomaternal outcome, Labor Analgesia.

## Introduction

Epidural analgesia is a central nerve blockade technique which involves the injection of a local anaesthetic into the lower region of spine, thus blocking the painful impulses that are generated from the nerves of the contracting uterus during labour [1]. Epidural analgesia is considered, at present to be the most effective and innocuous technique for providing pain relief during labour and delivery.

The quality of analgesia is far superior to that achieved by either parenteral or inhalational methods, while the mother remains alert, thus avoiding the risks related to the airway and allowing her participation in the process of childbirth. The versatility of continuous epidural anaesthesia using a catheter fulfills the variable analgesic requirements that occur in the dynamic process of labour, spontaneous delivery or cesarean section.

It is generally accepted that epidural analgesia, by decreasing or even abolishing physiological and biochemical changes caused by pain, benefits maternal and fetal status as well as labor progress in cases of dynamic dystocias. Low quality evidence shows that epidural analgesia may be more effective in reducing pain during labour and increasing maternal satisfaction with pain relief

than non epidural methods [2]. Nevertheless, the possible increase in instrumental or surgical deliveries caused by motor block still causes controversy among anaesthetists and obstetricians and has provoked considerable pharmacological modifications in the technique over the last few years.

## Materials and Methodology

### Study Design

This is a Prospective Interventional type of study which was conducted in the Department of Obstetrics and Gynaecology, B.J. Medical College, Civil Hospital, Ahmedabad for 2 years from June 2018 to June 2020. Epidural administration of opioids with local anaesthetic agent is a popular method for labor pain relief. According to Drug Controller General of India 0.1% Bupivacaine + 20 microgram Fentanyl is approved and widely practiced. Our study was revised and approved by Ethical Committee.

### Inclusion Criteria

Patients with full term pregnancy, who were admitted in labor room and willing to participate in the study after counselling, were

enrolled in the study after written and informed consent with following criteria:

#### Inclusion Criteria

Low risk singleton term pregnant patients with labor pains.

#### Exclusion Criteria

1. Coagulation disorders.
2. Patient refusal.
3. Abnormal presentation.
4. Previous history of complicated labor.
5. Cephalopelvic disproportion.
6. Any deviation from inclusion criteria.
7. History of allergic reaction to local anesthetics, bleeding diatheses.
8. Pre-existing neurological diseases, mental retardation, and neuromuscular disorder.
9. Local infection.
10. Abnormal spine.
11. Multiple pregnancy

Patients were taken to the Operation Theatre. Epidural catheter was kept and epidural analgesia given by anesthetists using standard techniques and aseptic precautions with drugs 0.1 % Bupivacaine and 20 microgram Fentanyl. Then monitoring of patient and fetus was done till delivery of the baby was done in the labor room itself. Assessment of pain was done by Visual analogue scale (VAS) and rupees scale. Degree of pain during labor was assessed using numerical pain score.

Quality of the analgesia throughout the labor was graded as:

- *Excellent*: Completely pain free and comfortable after 1st or 2nd injection until the delivery.
- *Good*: Satisfied but some pain was experienced for a short period during labor and delivery.
- *Incomplete*: Pain relief but experienced moderate pain during major time of normal labor and delivery.
- *Failure*: Pain experienced during major time of labor and delivery.
- *Not Possible to Evaluate*: Delivery by cesarean section or instrumental deliveries.

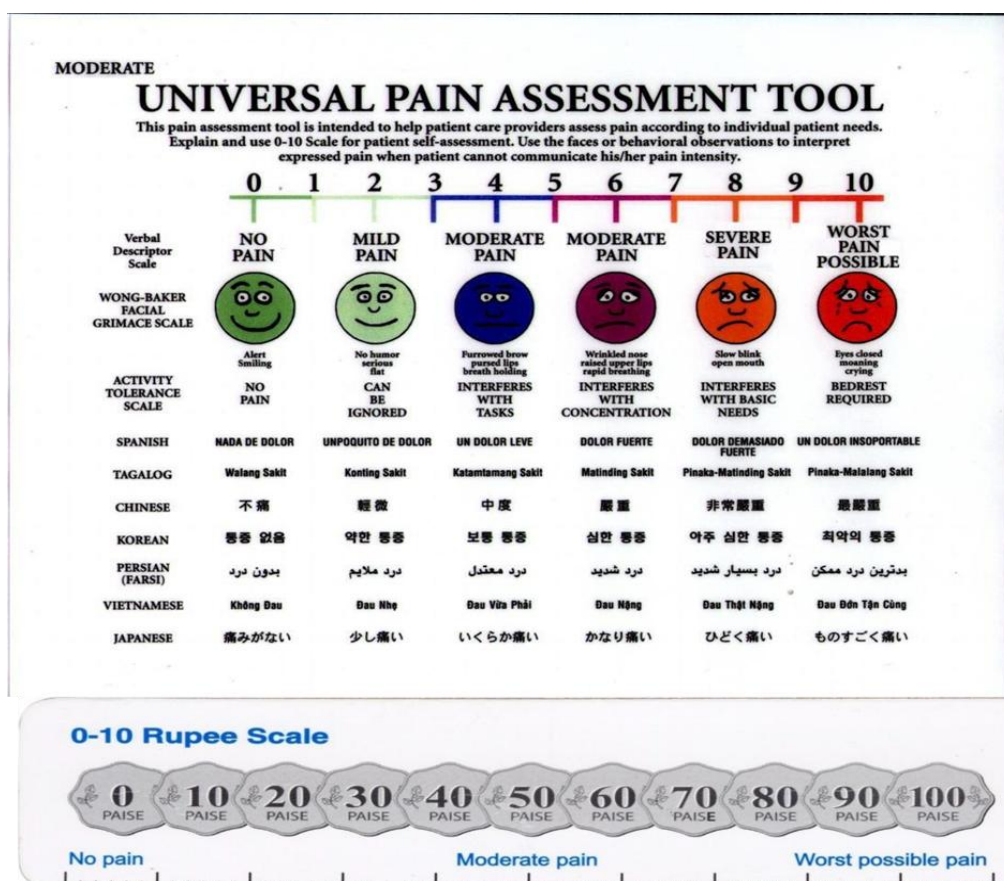


Figure1: Different pain score chart for pain assessment (www.researchgate.net)

## Observation and Results

Table 1: Demographic Data

Factors	Number	Percentage
<b>Age (years)</b>		
<20	7	28
20-30	15	60
>30	3	12
<b>Parity</b>		
1	15	60
2	6	24
3	4	16

Education Status		
Uneducated	8	32
Secondary school	10	40
Graduate	7	28
Residence		
Rural	8	32
Urban	17	68
BMI (KG/M2)		
<18.5	4	16
18.5-23	6	24
23-27	7	28
>27	8	32
Emergency/ Booked		
Emergency patients	8	32
Booked patients	17	68

Abbreviation- BMI= Body Mass Index

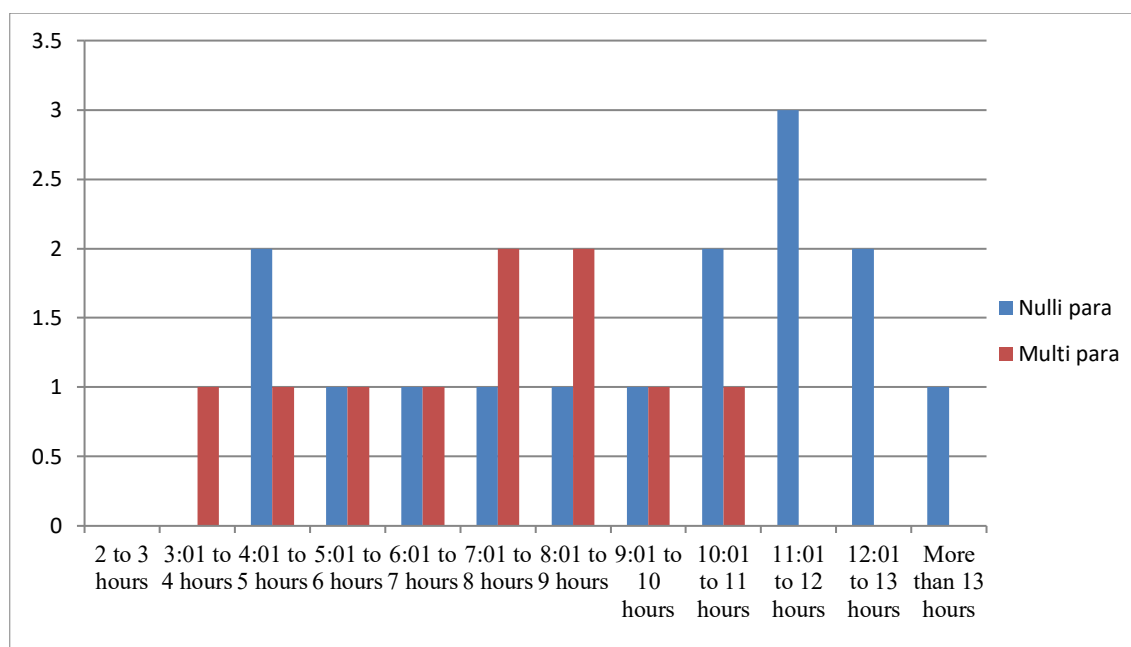


Figure 2: Duration of active first stage of labor

There was no prolongation of duration of first stage of labor in our study group.

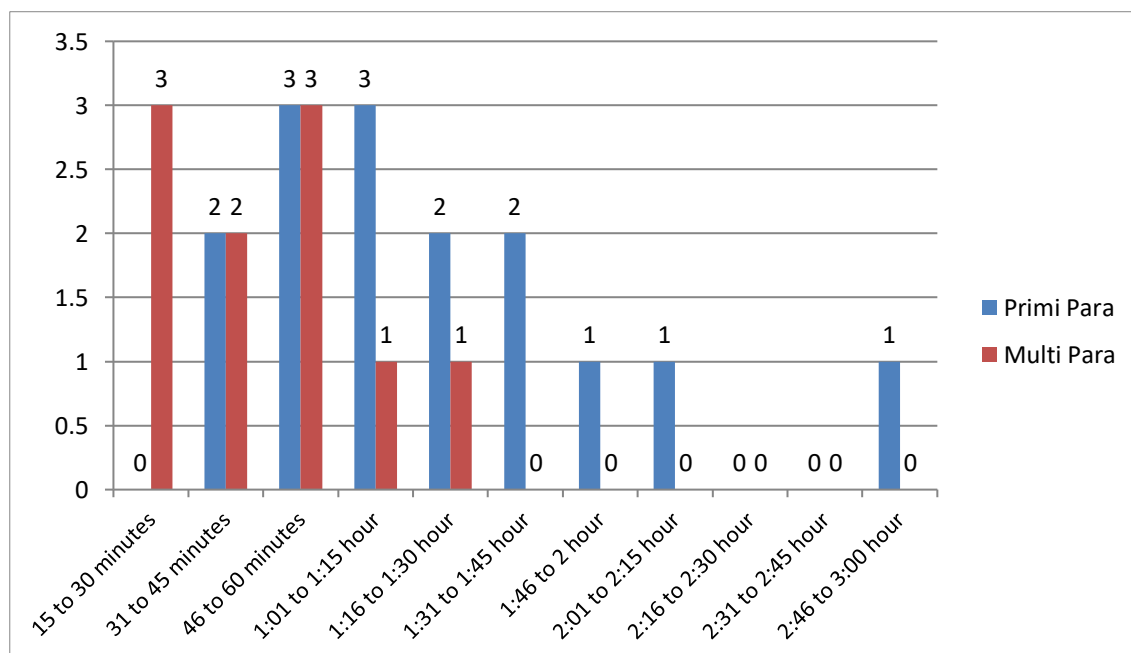


Figure 3: Duration of second stage of labor

There was no prolongation of second stage of labor in contrast to known literature. This variation may be due to small sample size of our study- the observation of increased incidence of uncommon event would require larger sample size.

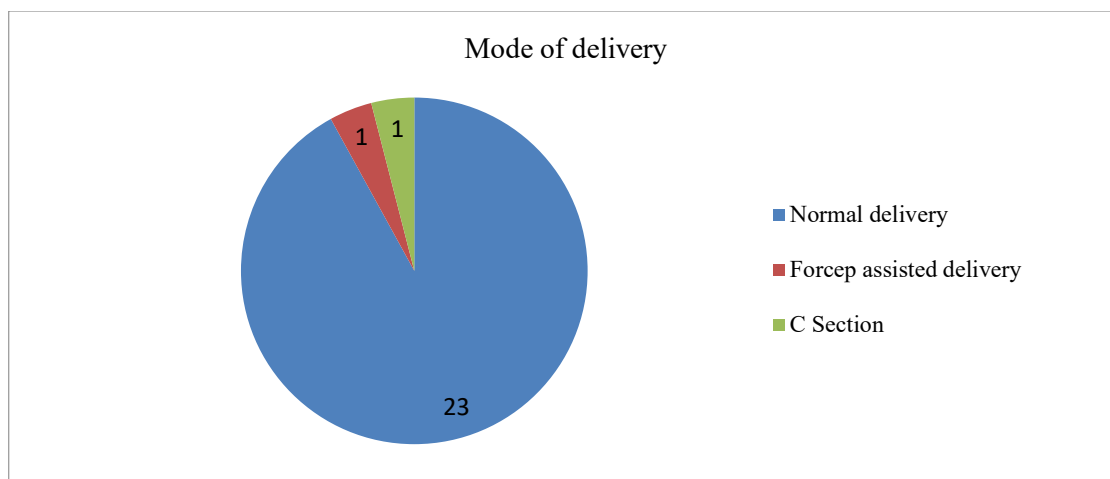
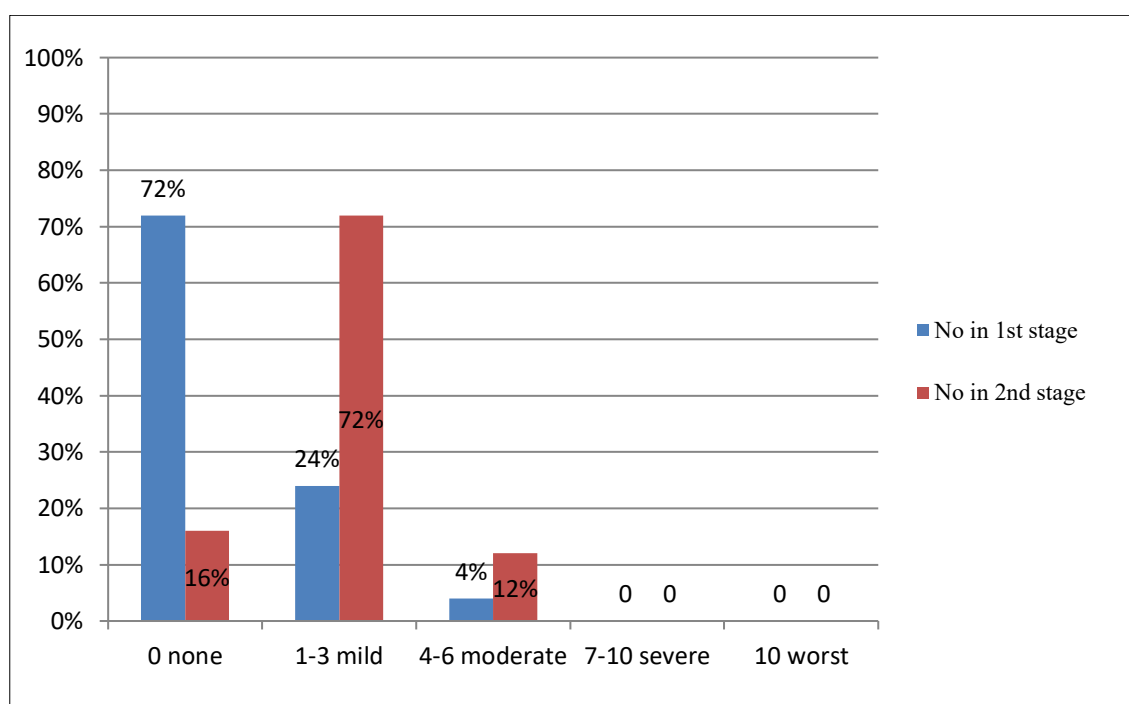


Figure 4: Mode of delivery

In our study 92% (23) patients underwent normal delivery, only 4% (1) patient underwent instrumental delivery and only 4% (1) patient underwent cesarean section for obstructed labor.



Abbreviation- VAS= Visual Analogue Scale

Figure 5: VAS score after epidural analgesia

From above we conclude that in present study, epidural analgesia had very good effect in 1st stage in terms of pain scoring.

Table 2: Maternal complications

Maternal complications	Number of patients	Percentage
Yes	4	16%
No	21	84%

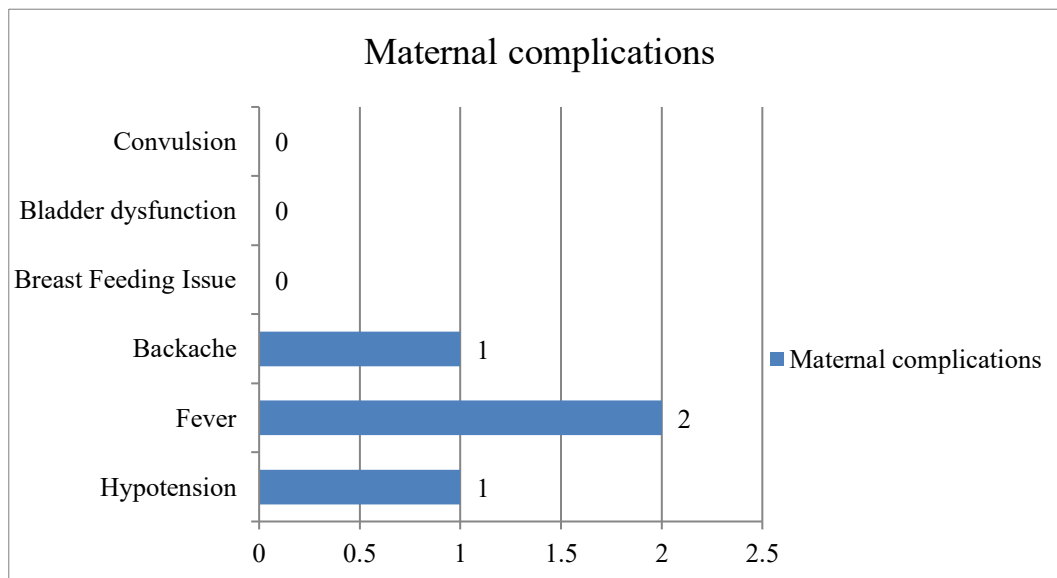


Figure 6: Maternal complications

There were few maternal complications like hypotension, respiratory depression, fever, headache and feeding problems. In our study we observed 4% case of maternal hypotension.

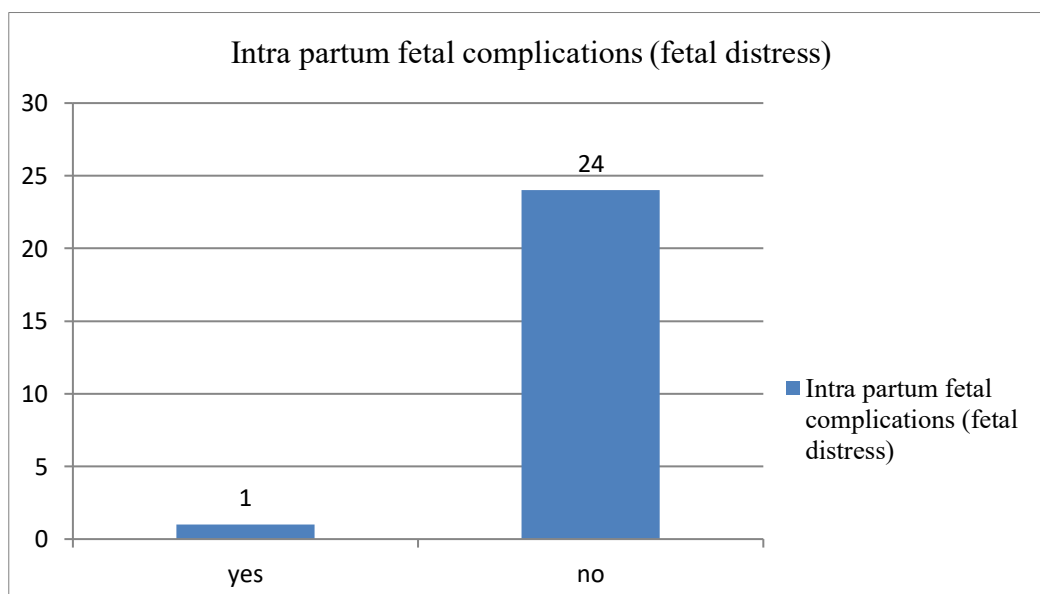


Figure 7: Fetal complications

Regarding neonatal outcome of the 25 delivered babies 1 was taken to NICU which had APGAR 3/4/5 at 1/5/10 minutes. Baby was discharged after 2 days with mother.

## Discussion

Epidural analgesia has been proved to be significantly effective as evident by visual analog scale in both first and second stage of labour. Several retrospective studies consistently demonstrated an association between epidural analgesia and increased duration of second stage of labour, but few randomised prospective studies could not find any significant relation regarding the effects of epidural analgesia on duration of labor as compared to non- epidural analgesia.

In our study we studied and observed 25 women going through labor after been given labor analgesia.

The age distribution showed that in our society most of the child bearing women belong to the age group 20-30 years with few having pregnancy at age greater than 30 years.

Parity of patient is a significant demographic indicator in obstetrics. 15 (60%) patients were primigravida, experiencing labor

pain for the first time, having no yard stick in their mind regarding previous delivery pain, while 6 (24%) patients were second gravida. Perception of pain in primigravida is different than in multigravida patients, as they are new to labor pain emotionally and physically. Second and third gravida patients could easily describe if labor pain in index pregnancy was less or more in view of previous labor pain.

Our current study and review of related articles revealed that the use of epidural analgesic have minimal motor blockade, and with addition of opioids like fentanyl and giving epidural analgesia at late stage of labor (>4 cm) provides better analgesic effect with minimal motor blockade of abdomino-pelvic muscles, encourages parturients to actively participate in expulsion of fetus under active obstetric management resulting in short duration of labor.

The studies demonstrated that parturients had severe type of pain in VAS before epidural analgesia but after 1 hour of that, around 98% of mother's intensity of pain reduced.

In our study (68%) patients were literate and (32%) were illiterate, showing tendency to accept idea of labor analgesia more in literate patients. Counselling patients regarding epidural analgesia is very important. Illiterate patients were little difficult to counsel because of difficulty in understanding physiology of labor and lumbar epidural technique.

Being a tertiary care centre, we received patients from rural as well as urban areas. 8 patients (32%) were of rural area while 17 patients (68%) were from urban locality showing tendency to accept idea of labor analgesia more in patients belonging to urban areas.

Out of 25 patients 17 (68%) patients were booked patients of department while 8 (32%) patients came directly to labor room. This data showed health awareness regarding pregnancy in our society. Still 32% patients lacked regular antenatal visits, lacking basic care during antenatal period. Even though they lacked regular antenatal visits, after thorough counselling they were agreed upon taking epidural analgesia. Emphasis should be given upon importance of counselling during antenatal period by medical/paramedical/intern doctors. Awareness regarding safety and efficacy of epidural obstetric analgesia can be increased by social media by audio, visual, radio, television and advertisements also.

In our study on epidural obstetric analgesia we had 4 patients (16%) belonging to BMI <18.5- underweight, 6 patients (24%) belonging to BMI 18.5-23- normal, 7 patients (28%)

belonging to BMI 23-27- Overweight, 8 patients (32%) belonging to BMI >27 - Obese group. In our study we found that women with an higher age and higher BMI had more predilection towards epidural obstetric analgesia. On review of literature, there are no studies directly reporting on the finding of increased rates of epidural analgesia in women with a higher BMI [1].

In our study we had encountered no patient with second stage of labour prolongation as compared to another study of Anim-Somuah et al [2].

A survey conducted in 2010 showed that increasing maternal age was a significant factor associated with a women's preference to have epidural analgesia during labor [3].

There was no prolongation of duration of first stage of labor in our study group. As per NICE guidelines [4] active stage of first stage of labor duration is average of 8 hours in primigravida patients, but it may extend up to 18 hours. In multipara, it is in average of 5 hours but may extend up to 12 hours. These maximum time limits were not reached in any of our study patients. Dipti Agrawal et al [5] which shows prolonged second stage of labor. Epidural analgesia increases second stage duration by 1 hour, so in primigravida patients second stage duration should be within 3 hour and in multigravida patients second stage duration should be within 2 hours. Duration more than these should be considered prolongation of second stage.

**Table 3: Comparison with different studies**

	Author	Year	First stage with epidural	Second stage with epidural	Instrumental delivery	LSCS
1	Anwer et al., [6]	2015	-	Prolong	higher	-
2	Anim-Somuah et al., [2]	2005	-	Prolong	higher	no difference
3	Mousa et al., [7]	2010	Not prolonged	Not prolonged	higher	no difference
4	Dipti Agrawal et al., [5]	2014	Short	Prolong	no difference	no difference
5	Present study	2019	Not prolonged	Not prolonged	no difference	no difference

In present study first and second stage of labor were not prolonged with epidural analgesia. In the late 1980s and early 1990s, several retrospective trials demonstrated an association between the use of epidural and increased cesarean rate. Few early studies have reported significantly higher incidences of cesarean or instrument deliveries with epidural analgesia as compared with systemic opiate drugs. In our institute, LSCS rate is almost 32% and of instrumental delivery is 5%, on applying statistical test chi square there was no statistically significant difference in the LSCS rate (p value = 0.101) and instrumental delivery rate (p value = 0.108) in our study group patients and other patients of our institute.

In our study 24 (80%) patients had normal vaginal delivery, 1 (3.33%) patient had instrumental forceps delivery, 1 patient (4%) had cesarean section. Epidural analgesia does not show any effect on descent of head in second stage of labor. Patient could bear down effectively. Epidural analgesia has excellent sensory effect with negligible motor effect. However, in our study one delivery was forceps assisted due to arrest in second stage of labor. Though women who receive epidural analgesia during labor are more likely to require instrumental or caesarean delivery, there is little evidence to suggest that the epidural itself is to be blamed. A more recent meta-analysis of 9 impact studies, including over 37,000 patients, found no increase in instrumental vaginal deliveries, when the epidural rate increased by 25% (8-9). It has been reported that the motor block which is the major complication of epidural analgesia might result in prolonged labor and therefore increase the rate of instrument assisted delivery [10].

Since 1980, the advent of epidural obstetric analgesia, has vastly reduced the adverse effects and has improved maternal status

due to it. Improvements include the retention of more motor function and even the ability to walk during labor also called as mobile epidural, better ability to bear down and also a reduction in hypotension and its accompanied adverse effects [4]. There were few maternal complications like hypotension, respiratory depression, fever, headache, feeding problems. In our study we observed 4% case of maternal hypotension, while in text Chestnut's Obstetric Anaesthesia: Principles and Practice, observed maternal hypotension rate of 10% in parturient patients given epidural analgesia [11].

Therefore, these complications are not clinically significant. We did not find any maternal hemodynamic compromise or any maternal intrapartum or postpartum complication.

In our study out of 25 fetuses, only one had abnormal FHR, which developed bradycardia with a positive contraction stress test showing late deceleration of heart rate. Regarding neonatal outcome of the 25 delivered babies, 1 was taken to NICU which had APGAR 3/4/5 at 1/5/10 minutes. Baby was discharged after 2 days with mother. In our study we have observed that fetal distress rate is 4% while randomized controlled trial of Abrao KC et al [12] identified fetal distress rate of 17% in parturient patients given epidural analgesia. This is in line with the COCHRANE review in 2011 [2].

Our study shows excellent VAS score with better scores in multigravida and in first stage of labor better than in 2<sup>nd</sup> stage. No patient had incomplete or failure of analgesia. By comparing pain score it was very evident that epidural analgesia is one of the best modalities in labor analgesia. Next delivery preference by epidural analgesia was 92% with 70% of patients showing excellent satisfaction. On comparing pain score of our study group patients



with other randomly selected patients who were delivered without epidural analgesia, it was very evident that epidural analgesia is effective with high level of patients' satisfaction (70%) to the extent that most of patients (92%) in our study group would prefer to choose this analgesia technique in subsequent delivery. This is in concordance with Cochrane Review in 2018 which concluded that pain intensity as measured using pain scores was lower in women with epidural analgesia when compared to women who received opioids and a higher proportion were satisfied with their pain relief, reporting it to be excellent or very good [13].

## Conclusion

Epidural analgesia is very safe and effective method for labor analgesia, with excellent analgesic sensory effect with negligible motor effect on labor without having any undesired effects on fetomaternal outcome such as prolongation of duration of labor, or an increase in instrumental and cesarean delivery with good fetal outcome. It is right of every mother to choose labor analgesia. Every mother should be made aware regarding options available for labor analgesia during antenatal period counselling. Therefore, labor analgesia should be implemented in routine obstetric practice where anaesthetists are available and should be a part of residency training program in teaching institutes.

## Declaration

## Ethical Approval and Consent to participate

Informed written consent has been taken from the patient and will be provided on request.

## Consent for publication

Informed written consent has been taken from the patient and will be provided on request.

## Availability of supporting data

None

## Funding Information

No funding was received for the study.

## Conflict of interest

None declared

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## Author Contributions

SNK involved in conceptualization and supervision, AK collected patient information, MD and AK involved in writing, editing manuscript. All authors reviewed the article and agreed on submission.

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