

EPIDURAL ANALGESIA IN LABOUR AND ITS OBSTETRIC OUTCOME

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Abstract

* Introduction: Labour is a natural phenomenon which produces intolerable pain that requires effective methods for pain relief which is often challenging and complex task without regional analgesia. Epidural analgesia is most widely accepted method used to reduce labour pain. * Aims and Objectives: Assessment of epidural analgesia in pain relief during labour, duration of different stages of labour, maternal and foetal outcome. * Methodology: This study is a Prospective Observational study conducted at RL JALAPPA Hospital, Kolar from January 2020 to June 2021. 40 women admitted for normal vaginal delivery opting labour analgesia were studied. Data collected was entered in Microsoft excel spread sheet and results were analysed. * Results: The mean duration of first stage of labour was 153 minutes, mean duration of second stage was 30 minutes, and mean duration of third stage was 12 minutes. During first stage of labour, 20 women (52%) had no pain, 12 women (31%) had mild pain and 6 women (15%) had moderate pain. During second stage of labour, 16 women (42%) had mild pain, 15 women (39%) had no pain and 7 women (18%) had moderate pain. During third stage of labour, 30 women (78.9%) had no pain and 8 women (21%) had mild pain. The mean Apgar score of all babies at 1 minute was 7/10 and 5 minute was 9/10. * Conclusion: Epidural analgesia is a safe and effective technique during labour and provides significant pain relief with excellent patient satisfaction.

INTRODUCTION

Labour is a physiologic process during which foetus, membranes, umbilical cord, and placenta are expelled from uterus. Many factors are involved in labour and are associated with unique experience by every woman. Pain during labour is highest ranked among all other pains experienced in life.¹ Untreated labour pain leads to chronic pain, post-partum stress syndrome, and psychological and physiological consequences which are undesirable. Pain and anxiety causes release of adrenaline which results in prolonged labour and the increase in the level of noradrenaline by 25%, uterine blood flow decreases by 50%. Maternal cardiac output, systemic vascular resistance and oxygen demand will be increased.² Labour is a natural phenomenon which produces intolerable pain that requires effective methods for pain relief which is often challenging and complex task without regional analgesia.³ Labour pain management during delivery plays an important role in woman's satisfaction.⁴ Pain is originated from cervix during first stage of labour. The pressure on perineum by the descending foetus causes additional pain during late first stage. It causes stretching, distension and tearing of pelvic fascia, subcutaneous tissues and muscles of the perineum.⁵ Painful stimuli from cervix and lower uterine segment are transmitted to tenth, eleventh, and twelfth thoracic and first lumbar spinal portions via sympathetic nerve fibres after entering the spinal cord.⁸ Sensory impulses from vagina and perineum carried to second, third and fourth spinal segments via pudendal nerves. Additionally, pressure on a single or more root base of the lumbosacral plexus causes hurting, burning, or distress in the lower limbs and back.⁹ Lumbar epidural analgesia is most widely accepted method used to reduce labour pain. This involves blocking of painful senses by injecting local anaesthetic into lower region of spine.¹¹ It is usually very effective and very safe.

AIMS AND OBJECTIVES

1. Assessment of epidural analgesia in pain relief during labour by using Visual Analogue scale.
2. Assessment of epidural analgesia on duration of different stages of labour
3. Assessment of foetal outcome by using APGAR Score

METHODS

Setting : RL JALAPPA HOSPITAL, DEPARTMENT OF OBSTETRICS AND GYNAECOLOGY, KOLAR

Population : Pregnant women admitted to labour room in RL JALAPPA HOSPITAL during the period of study.

Design : Prospective Observational study.

STUDY PERIOD: January 2020-June 2021.

Inclusion Criteria:

- 1) Age between 20 to 35 years & gestational age between 37-40 weeks
- 2) Singleton pregnancy
- 3) Clinically adequate pelvis, cephalopelvic disproportion ruled out
- 4) Subjects included were non-smokers, non-alcoholics, and not suffering from any acute infections or chronic illnesses.

Exclusion Criteria:

- 1) Elderly primigravidae, gestational diabetics, chronic hypertensives, multiple gestation, preeclampsia.
- 2) Previous caesarean section women
- 3) Cardiac disorders
- 4) Spinal deformities
- 5) Coagulation disorders

METHODOLOGY:

Pregnant women admitted to labour room of RL JALAPPA Hospital were the study population. At the time of enrolment, an informed written consent was obtained from the patients. After the onset of true labour pains, epidural catheter was inserted and epidural analgesia was activated with adequate dose of 0.125% Bupivacaine and subsequent top ups given as required. Maternal heart rate, blood pressure, foetal heart rate were monitored following insertion of epidural catheter. Each woman was followed up until delivery and the outcome was recorded and parameters involved with pain perception, duration of labour were noted. Maternal pain severity assessed by Visual Analogue Scale Patient was asked to place a finger over the scale, according to the intensity of pain felt by her No pain-0 to 4mm

Mild pain-5-44mm

Moderate pain-45-74mm

Severe pain-75-100mm

SAMPLE SIZE CALCULATION : 40 Female patients who were admitted for normal delivery opting labour analgesia are studied. Data collected was entered in Microsoft excel spread sheet. The results were analysed.

OBSERVATION AND RESULTS

DATA ANALYSIS

VAS score, Duration, APGAR score etc., were considered as primary outcome variables. Descriptive analysis was carried out by mean and standard deviation for quantitative variables, frequency and proportion for categorical variables. Data was also represented using appropriate diagrams like bar diagram and pie diagrams. The association between quantitative outcomes at different time period was assessed by comparing the median values. Mean differences along with their 95% CI were presented. Paired t- test was used to assess statistical significance. The association between categorical outcomes at different time periods was assessed by cross tabulation and comparison of percentages. McNemar test was used to test statistical significance. P value < 0.05 was considered statistically significant.

Out of total 40 study population, the mean age group was 24years, (Table 1). In this study, 20(50%)women were primigravidae and 20(50%) were multigravidae(Table 2,Figure 1)

The mean gestational age was 39weeks to 40weeks 6 days in 28 women (70%) out of 40 women .The gestational age in 11 women was between 37weeks to 38weeks 6 days and gestational age of 1woman was more than 40weeks(Table 3,Figure 2) The mean duration of first stage of labour was 153 minutes, mean duration of second stage was 30minutes, and mean duration of third stage was 12 minutes(Table 4)

VAS at first stage, second stage, third stage were illustrated in Tables 5, 6, 7 and Figures 3, 4, 5 respectively. Analysis of PPH and patient satisfaction shown in Tables 8, 9 and Figures 6, 7. APGAR scores at 1 minute and 5 minutes given in Table 10.Mode of delivery incidence is illustrated in Table 11, Figure 8.

Comparison of VAS at first stage across second and third stages shown in Tables 12, 13 and Figures 9, 10.

Table 14 gives the values of mean duration at different stages of labour.

DISCUSSION

Labour is a natural phenomenon which produces intolerable pain that requires effective methods for pain relief. Labour pain management with epidural analgesia during delivery plays an important role in woman's satisfaction.

This study is a Prospective Observational study conducted at RLJ Hospital, Kolar from January 2020 to June 2021.40 woman admitted for normal vaginal delivery opting labour analgesia were studied.

AGE, PARITY, GESTATIONAL AGE

Out of total 40 study population, the mean age group was 24years

In this study, 20(50%)women were primigravidae and 20(50%) were multigravidae

The mean gestational age was 39weeks to 40weeks 6 days in 28 women (70%) out of 40 women

DURATION OF STAGES OF LABOUR

The mean duration of first stage of labour was153 minutes, mean duration of second stage was 30minutes, and mean duration of third stage was 12 minutes.

In a study conducted by Dipti agrawal et al, Epidural analgesia by ropivacaine in Indian nulliparous resulted in reduced duration in first stage and prolonged duration of second stage of labour compared with parturients without analgesia; however, instrumental vaginal or caesarean delivery rate does not increase in the epidural group.²⁸In a research article by Aweda AP et al, stated use of epidural analgesia for pain relief is associated with prolonged first stage of labour and does not prolong second stage of labor.³¹In a study conducted by Henos Enyew Ashagrie et al, concluded that Effective epidural analgesia can prolong second stage of labour and might increase rate of instrumental vaginal delivery.³⁸

PAIN RELIEF

During first stage of labour, 20 women(52%) had no pain,12 women(31%) had mild pain and 6 women(15%) had moderate pain

During second stage of labour, 16 women (42%) had mild pain, 15 women(39%) had no pain and 7 women(18%) had moderate pain

During third stage of labour, 30 women (78.9%) had no pain and 8 women(21%) had mild pain. In a study conducted by Sawant V Kumbhar A. concluded Epidural analgesia appears to have significant pain relief as compared to no analgesia during labour.³³

COMPLICATIONS

Out of 38 women who had normal vaginal delivery, 1 participant (2.6%) had postpartum hemorrhage .p value(less than 0.05) is statistically significant

In a study conducted by Shuzhi Luo et al, early administration of epidural analgesia increases postpartum blood loss.⁴¹

There was no Blood transfusion reported in the study population, no puerperal complications reported as well and no death had occurred in the study participants.

PATIENT SATISFACTION

21 women (55%) experienced good satisfaction, 16 women (42%) had excellent satisfaction with epidural analgesia.

In a study conducted by Nathan Hitzeman et al, concluded Epidural analgesia is effective in reducing pain during labor .Epidural analgesia had no statistically significant impact on risk of caesarean delivery, maternal satisfaction with pain relief, or long-term backache, and no immediate effect on neonatal status as determined with Apgar scores.²⁶

NEONATAL OUTCOME

The mean Apgar score of all babies at 1 minute was 7/10 and 5 minute was 9/10.

D Angelo R concluded in his study that Epidural analgesia report less pain during labour and did not affect foetal oxygenation and 5-minute APGAR Score.²³In a study conducted by Ban Leong Sng et al. did not show any difference in caesarean section or instrumental birth, duration of second stage of labour, Apgar scores at one minute and five minutes.⁴²

MODE OF DELIVERY

Out of 40 study population, 38 women (95%) had normal vaginal delivery and 2 women (5%) underwent caesarean delivery .P value(less than 0.05) is statistically significant

Gribble RK, Meier PR in their study demonstrated that availability of on-demand epidural analgesia in labour did not increase the primary caesarean rate.²²In a review article by wassen et al, there was no increased risk of caesarean delivery or instrumental vaginal delivery for women receiving early epidural analgesia at cervical dilatation of 3 cm or less when compared to late epidural analgesia.²⁵

SUMMARY

- Out of total 40 study population , the mean age group was 24years
- In this study, 20(50%)women were primigravidae and 20(50%) were multigravidae
- The mean gestational age was 39weeks to 40weeks 6 days in 28 women (70%) out of 40 women
- The mean duration of first stage of labour was 153 minutes, mean duration of second stage was 30minutes, and mean duration of third stage was 12 minutes
- During first stage of labour, 20 women(52%) had no pain,12 women(31%) had mild pain and 6 women(15%) had moderate pain

- During second stage of labour, 16 women (42%) had mild pain, 15 women(39%) had no pain and 7 women(18%) had moderate pain
- During third stage of labour, 30 women (78.9%) had no pain and 8 women(21%) had mild pain
- Out of 38 women who had normal vaginal delivery, 1 participant (2.6%) had postpartum hemorrhage.
- 21 women(55%) experienced good satisfaction, 16 women(42%) had excellent satisfaction with epidural analgesia
- The mean APGAR score of all babies at 1 minute was 7/10 and 5 minute was 9/10.
- There was no Blood transfusion reported in the study population, no puerperal complications reported as well and no death had occurred in the study participants.
- Out of 40 study population,38 women (95%) had normal vaginal delivery and 2 women(5%) underwent caesarean delivery

CONCLUSION

- Epidural analgesia is a safe and effective technique during labour and provides significant pain relief with excellent patient satisfaction.
- There is no prolongation in the time duration of first, second and third stages of labour. Epidural analgesia does not increase the incidence of caesarean delivery.
- There is no adverse effect on neonatal outcome

LIMITATIONS

- The sample size of study population was less.
- Preeclampsia, Gestational Diabetes mellitus, Cardiac disorders, Coagulation disorder cases were not included in our study.
- Long term side effects were not evaluated.

DISCLOSURE OF INTERESTSThe authors have no conflicts of interest to declare in relation to this article. Complete disclosure of interest forms are available to view online as supporting information

ETHICS APPROVAL

This study was approved on September 15, 2022 by Ethical Clearance Review Board of SDUMC, Kolar, Karnataka

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REFERENCES

1. Agrawal D, Makhija B, Arora M, Haritwal A, Gurha P. The effect of epidural analgesia on labour, mode of delivery and neonatal outcome in nullipara of India, 2011-2014. *J Clin Diag Res.* 2014;8(10):OC03.
2. Mousa WF, Al-Metwalli R, Mostafa M. Epidural analgesia during labor vs no analgesia: a comparative study. *Saudi J Anaesthesia.* 2012;6(1):36.
3. Sienko J, Czajkowski K, Swiatek-zdzienicka M. Epidural analgesia and the course of delivery in term primiparas. *Ginekol Pol.* 2005;76:806-11.
4. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. *Cochrane Database Syst Rev.* 2011:CD000331.
5. Raja KS, Tasleem H. Influence of epidural analgesia on frequency of instrumental delivery and duration of labour. *Rewal Medical J.* 2009;34:86-8.
6. Kuhnert BR, Linn PL, Kennard MJ, Kuhnert PM. Effects of low doses of meperidine on neonatal behavior. *Anaesth Analg.* 2002;64:335-42.
7. Sekhavat L, Behdad S. The effects of meperidine analgesia during labor on fetal heart rate. *Int J Biomed Sci.* 2009;5:59-62.
8. Littleford J. Effects on the fetus and newborn of maternal analgesia and anesthesia: A review. *Can J Anaesth.* 2004;51:586-609.

9. Milwidsky A, Finci-Yeheskel Z, Mayer M. Direct stimulation of urokinase, plasmin, and collagenase by meperidine: A possible mechanism for the ability of meperidine to enhance cervical effacement and dilation. *Am J Perinatol.* 1993;10:130
10. Yilmaz B, Kart C, Kelekci S, Gokturk U, Sut N, Tarlan N, et al. Meperidine versus valethamate bromide in shortening the duration of active labor. *Int J Gynaecol Obstet.* 2009;107:126–9.
11. Schnider SM, Abboud TK, Artal R, Henriksen EH, Stefani SJ, Levinson G. Maternal catecholamines decrease during labor after lumbar epidural anesthesia. *Am J Obstet Gynecol.* 1983;147:13–5.
12. Kotaska AJ, Klein MC, Liston RM. Epidural analgesia associated with low-dose oxytocin augmentation increases cesarean births: A critical look at the external validity of randomized trials. *Am J Obstet Gynecol.* 2006;194:809–14.
13. Impey L, MacQuillan K, Robson M. Epidural analgesia need not increase operative delivery rates. *Am J Obstet Gynecol.* 2000;182:358–63.
14. Thorp JA, Hu DH, Albin RM, McNitt J, Meyer BA, Cohen GR, et al. The effect of intrapartum epidural analgesia on nulliparous labor: A randomized, controlled, prospectived trial. *Am J Obstet Gynecol.* 1993;169:851–8
15. Gambling DR, Sharma SK, Ramin SM, Lucas MJ, Leveno KJ, Wiley J, et al. A randomized study of combined spinal-epidural analgesia versus intravenous meperidine during labor: Impact on caesarean delivery rate. *Anaesthesiology.* 1998;89:1336–44
16. Wong CA, Scavone BM, Peaceman AM, McCarthy RJ, Sullivan JT, Diaz NT, et al. The risk of cesarean delivery with neuraxial analgesia given early versus late in labor. *N Engl J Med.* 2005;352:655–65.
17. Turcot L, Marcoux S, Fraser WD. Multivariate analysis of risk factors for operative delivery in nulliparous women. *Am J Obstet Gynecol.* 1997;176:395–402.
18. Effect of low dose mobile versus traditional epidural techniques on mode of delivery: A randomised controlled trial. *Lancet.* 2001;358:19–23.
19. Halpern SH, Stephen SM. Epidural analgesia for labor: Current techniques. *Local and Regional Anesthesia.* 2010;3:143–53.
20. Morgan-Ortiz F, Quintero-Ledezma JC, Perez-Sotelo JA, Trapero-Morales M. Evolution and quality of care during labor and delivery in primiparous patients who underwent early obstetrical analgesia. *Ginecol Obstet Mex.* 1999;67:522–6.
21. Friedman EA. The graphic analysis of labour .*Am J Obstet Gynecol.*1954;686:1568-75.
22. Gribble RK , Meire PR. Effect of epidural analgesia on the primary caesarean rate, *Obstet Gynecol* 1991;78:231-4.
23. D Angelo R. Epidural PCA during labour .*Am Soc Anesthes Newsl.* 2001;65:16-8.
24. Desai Pankaj , Patel Puri , Gupta Ashoo , Virk Gurpreet Kaur, Sinha Archana. Epidural analgesia in labour *Obstet Gynecol India* Vol.56,No.5: September/ 2006 417-422.
25. M M L H Wassen - Early versus late epidural analgesia and risk of instrumental delivery in nulliparous women: a systematic review - 2011 May;118(6):655-61.
26. Nathan Hitzeman , Shannon Chin - Epidural analgesia for labor pain -2012 Aug 1;86(3):241-2.
27. David Gambling , Jonathan Berkowitz, Thomas R Farrell, Alex Pue, Dennis S - A randomized controlled comparison of epidural analgesia and combined spinal-epidural analgesia in a private practice setting: pain scores during first and second stages of labor and at delivery - 2013 Mar;116(3):636-43.
28. Dipti Agrawal, Bela Makhija, Manjeet Arora, Arpana Haritwal, Pavan Gurha - The effect of epidural analgesia on labour, mode of delivery and neonatal outcome in nullipara of India, 2011-2014 - 2014 Oct;8(10):OC03-6.
29. Tai-Ho Hung, T'sang-T'ang Hsieh, Hung-Pin Liu. - Differential Effects of Epidural Analgesia on Modes of Delivery and Perinatal Outcomes between Nulliparous and Multiparous Women: A Retrospective Cohort Study - 2015 Mar 25;10(3):e0120907.
30. Angeliki Antonakou and Dimitrios Papoutsis. The Effect of Epidural Analgesia on the Delivery Outcome of Induced Labour: A Retrospective Case Series. *Obstetrics and Gynaecology International* Volume 2016,Article ID 5740534
31. Aweda AP1, Rutahoile WM2, Jackson PM3, Liao B1, and Zhou X - The Outcome Analysis of Epidural

- Analgesia on Labor in Primigravid Women: A Systematic Review and Meta-Analysis Focusing on Duration of Labor - *J Pain Manage Med* 2016, 2:3.
32. Lieliang Zhang - Efficacy of epidural analgesia with ropivacaine on labor, maternal, and neonatal: a meta-analysis of prospective and retrospective studies - *Int J Clin Exp Med* 2016;9(5):7896-7907.
 33. Sawant V, Kumbhar A. Labour with low dose epidural analgesia :maternal perception and foetal outcome .*Int J Reprod Contracept Obstet Gynecol* 2018;7:689-93.
 34. Varsha Laxmikant Deshmukh, Shaswatee S Ghosh, Kanan A Yelkar, Shreeniwas N Gadappa - Effects of Epidural Labour Analgesia in Mother and Foetus - 2018 Apr;68(2):111-116.
 35. Naito Y et al the effect of labor epidural analgesia on labor, delivery, and neonatal outcomes: a propensity score-matched analysis in a single Japanese institute. *JA clinical reports* 2019 5:40
 36. Huifen Yin, Rong Hu - A cohort study of the impact of epidural analgesia on maternal and neonatal outcomes - 2019 Aug;45(8):1435-1441.
 37. Jing Sun Epidural Labor Analgesia Is Associated with a Decreased Risk of the Edinburgh Postnatal Depression Scale in Trial of Labor after Cesarean: A Multicenter, Prospective Cohort Study- 2020 Jan 16;2020:2408063.
 38. Henos Enyew, AshagrieDemeke, YilkalFentie, Habtamu , Getinet Kassahun-A review article on epidural analgesia for labor pain management: A systematic review - *International Journal of Surgery Open* 24 (2020) 100e104.
 39. K K Lam, M K M Leung , M G Irwin Labour analgesia: update and literature review - 2020 Oct;26(5):413-420.
 40. Ying Zha et al - Epidural analgesia during labor and its optimal initiation time-points: A real-world study on 400 Chinese nulliparas - 2021 Mar 5;100(9):e24923.
 41. Shuzhi Luo , Zhaowen Chen , Xujian Wang, Changyu Zhu, Shili Su - Labor epidural analgesia versus without labor epidural analgesia for multiparous women: a retrospective case control study - 2021 Apr 28;21(1):133.
 42. Ban Leong Sng et al - Early versus late initiation of epidural analgesia for labour -2008
 43. Liu S, Carpenter RL, Neal JM. Epidural anesthesia and analgesia. *Anaesthesiology* . 1995;82:1474-1506
 44. Grass JA. The role of epidural anesthesia and analgesia in postoperative outcome. *Anaesthesiol Clin North America* . 2000;18:407-428
 45. Park WY, Thompson JS, Lee KK. Effect of epidural anesthesia and analgesia on peri-operative outcome. *Ann Surg* . 2001;234:560-571.
 46. M Silva, SH Halpern. Epidural analgesia for labour: Current techniques. *Local and Regional Anesthesia*. 2010;3:143-53.
 47. JM Beazley, EP Leaver, JHM Morewood, J Bircumshaw. Relief of pain in labour. *Lancet*. 1967;1:1033-35
 48. B Morgan, CJ Bulpitt, P Clifton, PJ Lewis. Effectiveness of pain relief in labour: survey of 1000 mothers. *BMJ*. 1982;285:689-90
 49. BA Bucklin, JL Hawkins, JR Anderson, FA Ullrich. Obstetric anesthesia workforce survey: Twenty-year update. *Anaesthesiology*. 2005;103:645-53
 50. I Findley, G Chamberlain. ABC of labour care. Relief of pain. *BMJ*. 1999;318:927-30.
 51. S Fyनेface-Ogan, CN Mato, SE Anya. Epidural anesthesia: views and outcomes of women in labour in a Nigerian hospital. *Ann Afr Med*. 2009;8:250-56
 52. LC Tsen, B Thue, S Datta, S Segal. Is combined spinal-epidural analgesia associated with more rapid cervical dilation in nulliparous patients when compared with conventional analgesia *Anaesthesiology*. 1999;91:920-25

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