International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Khatun M et al. Int J Reprod Contracept Obstet Gynecol. 2024 Apr;13(4):837-841
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20240774

Original Research Article

Evaluation of the effects of epidural labour analgesia on mode of delivery

Marufa Khatun[1]*, M. Abdur Rahim[2], Fatema Rahman[3]

[1]Department of Obstetrics and Gynaecology, Universal Medical College Hospital, Dhaka, Bangladesh
[2]Department of Neuro-Intensive Care, Square Hospitals Ltd, Dhaka, Bangladesh
[3]Department of Obstetrics and Gynaecology, Dhaka Medical College, Dhaka, Bangladesh

Received: 08 January 2024
Accepted: 18 March 2024

***Correspondence:**
Dr. Marufa Khatun,
E-mail: marufa.dmc.k67@gmail.com

ABSTRACT

Background: Epidural analgesia is the most effective method of pain relief during labour and the only method that provides complete analgesia without maternal or foetal adverse effects. This study aimed to assess the mode of delivery outcomes of labour in women who had received effective epidural analgesia.
Methods: After ethical approval, this quasi-experimental study was carried out in Dhaka Medical College Hospital for one year, from July 2021 to June 2022. A total of 100 admitted pregnant women (37 weeks to 41 weeks) in the labour ward were included in the study according to the inclusion and exclusion criteria. Among them, 50 women were in group A (with epidural analgesia), and the other 50 were in group B (without epidural analgesia). A detailed history and thorough clinical examination were carried out on each patient. Data were collected in separate case-record forms and analyzed using SPSS 24.
Results: Mean age, gestational age, parity, and body mass index were statistically similar in both group A and B. Normal vaginal delivery rate (86% vs. 90%), instrumental delivery rate (10% vs. 6%), and caesarean section rate (4% vs. 4%) were not significantly different in both groups. Besides, both group A and B had statistically similar APGAR scores at 1st (8.66±0.87 and 8.80±0.83 respectively, p=0.414) and 5th min (9.66±0.68 and 9.74±0.59 respectively, p=0.537).
Conclusions: Epidural labour analgesia can be safely recommended as a method of labour analgesia, provided the prerequisites are fulfilled. It has no significant adverse effect on the mode of delivery.

Keywords: Epidural labour analgesia, Mode of delivery, Labour, Neonatal outcome

INTRODUCTION

One of the worst known and most severe forms of pain known to mankind is that of labour. The pain gets progressively severe as labour advances and is often aggravated by anxiety, fear and ignorance. The effects of labour pain are mainly hypercarbia, loss of consciousness and decreased uterine blood flow.[1] Among the pharmacological techniques, entonox (50% nitrous oxide in oxygen) is found inadequate to pain relief in 30%-40% patients and has occupational hazards to healthcare professionals. Systemic opioids have depressant effects both on the mother and the baby. Epidural analgesia is regional anesthesia that blocks pain in a particular region of the body. It blocks the nerve impulses from the lower spinal segments of the body. The goal is to provide pain relief during labour.[2] In developed countries, as many as 50% of all parturient are epidural users; whereas up to 81% of nulliparous parturient are epidural users.[3]

Epidural analgesia is considered to be the most effective method of pain relief during labour and the least depressant

form of analgesia and is often the preferred choice of analgesia. Epidural analgesia lowers epinephrine concentrations, thus improving uterine contractions and placental perfusion.[4,5] Epidural analgesia reverses the adverse ventilator effects of pain and results in an increase in oxygen tension in both mother and foetus, which may be beneficial, especially when additional conditions contribute to foetal or maternal hypoxia. Hence, epidural analgesia should be strongly recommended to all patients who do not have any contraindications to this method of treatment.[6,7] There has been a lot of controversy regarding use of epidural analgesia with respect to risks of caesarean delivery, vaginal delivery requiring use of forceps or vacuum extraction, use of oxytocin and progress of labour and thus has been extensively studied.[8] Some studies found that epidural analgesia combined with low-dose oxytocin infusion would increase the rate of caesarean delivery and early detection of dystocia and high-dose oxytocin augmentation should be considered for women receiving EA. Women experiencing dysfunctional labour have increased analgesic requirements and fewer spontaneous vaginal deliveries. The epidural top-ups are required for dysfunctional labour and the women are subsequently at a higher likelihood of requiring a cesarean delivery. The relationship between the need for epidural and delivery outcome therefore remains unclear. It is difficult to determine if the epidural top-up necessitated an operative delivery or if the top-up was required for inadequate analgesia due to dystocia. Dystocia, rather than a local anesthetic bolus, seems more likely responsible for the increased assisted vaginal and cesarean deliveries. Previously, labour epidural analgesia was associated with higher rates of assisted vaginal deliveries, and possibly higher cesarean delivery rates.[9-11] High concentrations of local anesthetic may reduce oxytocin release by affecting pelvic autonomic nerves, increasing the chance of assisted vaginal delivery.[4] This is due to prolonged second stage of labour which is the effect of lumbar epidural analgesia (LEA) on the progress of labor and foetal outcome.[12]

Where other studies found no such evidence of a significant difference in the risk of caesarean section. However, it might be associated with an increased risk of instrumental delivery.[13-15] But parturient who choose epidural have some other confounding factors that may lead to prolonged labour and increased rate of assisted vaginal delivery.[12] This study aimed in studying the effect of epidural analgesia on mode of delivery.

METHODS

It was a quasi-experimental study over a period of one year from July 2021 to June 2022. This study was carried out in the Department of Obstetrics and Gynecology in collaboration with the Department of Anesthesia, Analgesia, Palliative and Intensive Care Medicine, Dhaka Medical College Hospital, Dhaka.

To calculate sample size for study, the following formula was followed

Sample size, $n = \frac{P_1\,(100-P_1)+P_2\,(100-P_2)}{(P_1-P_2)^2}(Z_\alpha + Z_\beta)^2$

Here,

P_1=Proportion of prolonged 2nd stage with epidural analgesia=36%, P_2=Proportion of prolonged 2nd stage without epidural analgesia=10%.[16]

Z_α=1.96 (at 5% level of significance), Z_β=1.28 (at 90 % power)

Therefore,

n $=\frac{36\,(100-36)+10(100-10)}{(36-10)^2}(1.96+1.28)^2$ =49.75

There were two groups, group A (with epidural analgesia) consisted of 50 and group B (without epidural analgesia) contained 50. The inclusion criteria of our study were maternal age (18-35 years), gestation week (37-41 weeks), women in labour diagnosed by regular uterine contractions and at least 4 cm cervical dilatation, normal foetal heart rate pattern (CTG) before starting epidural analgesia. Women with medical or obstetrical complications, contracted pelvis/cephalopelvic disproportion any uterine scar like previous LSCS, myomectomy, placenta previa, any foetal congenital anomaly and anatomical deformity of spine or any local infection were excluded from this study. The independent variable was use of epidural analgesia, dependent variables were mode of delivery, APGAR score, and confounding variables were diabetes mellitus, obesity (BMI≥30 kg/m^2) and inadequate uterine contraction.

A structured data collection form was developed containing all the variables of interests. Data was collected by interview, observation and clinical examination. Having approval from ethical review committee (ERC), the purpose and procedure of the study were discussed with selected subjects. Written consent was taken from those who agreed to participate in the study.

RESULTS

Among them 50 women were under went epidural analgesia (case=group A) and 50 women were without epidural analgesia (control=group B). Results observed were analyzed and described in the subsequent section.

Majority of the women were aged below or equal 30 years among both group A (88%) and B (82%). Mean age of group A and B was 22.4±4.5 years and 22.9±5.2 years accordingly.

Table 1: Age distribution of the study participants, (n=100).

Age group (in years)	Group A, (n=50) (%)	Group B, (n=50) (%)	P value
≤30	44 (88)	41 (82)	0.577 (C)
>30	6 (12)	9 (18)	
Mean ± SD	22.4±4.5	22.9±5.2	0.639 (t)
Total	50 (100)	50 (100)	

P value was determined by (C) Chi-square test and (t) Independent sample t test.

Table 2: Distribution of the study participants according to gestational age, (n=100).

Gestational age (in weeks)	Group A, (n=50) (%)	Group B, (n=50) (%)	P value
37-40	45 (90)	46 (92)	1.00 (C)
>40	5 (10)	4 (8)	
Mean ± SD	38.2±1.3	38.1±1.3	0.759 (t)
Total	50 (100)	50 (100)	

P value was determined by (C) Chi-square test and (t) Independent sample t test.

The majority of the participants had gestational age within 37 to 40 weeks in both groups. No significant difference was found between both groups regarding the gestational age.

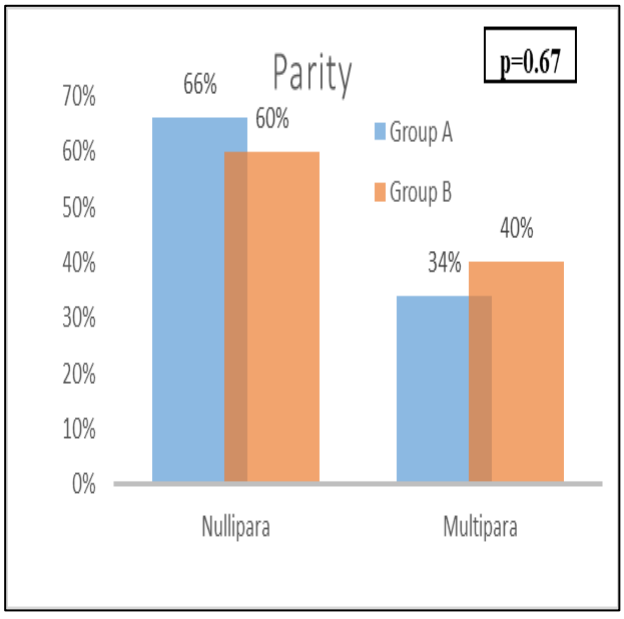

Figure 1: Distribution of the study participants according to parity, (n=100).

P value was determined by Chi-square test.

In group A, 66% patients were nullipara and 34% patients were multipara whereas in group B, 60% patients were nullipara and 40% patients were multipara. Parity was statistically similar in both group A and B (p=0.679).

Table 3: Body mass index of the study participants, (n=100).

BMI (kg/m^2)	Group A, (n=50) (%)	Group B, (n=50) (%)	P value
18.5-24.9	32 (64)	31 (62)	1.00 (C)
25-29.9	18 (36)	19 (38)	
Mean ± SD	24.8±2.5	24.7±2.2	0.818 (t)
Total	50 (100)	50 (100)	

P value was determined by (C) Chi-square test and (t) independent sample t test.

Most of the participant's body mass index (BMI) was within the range of 18.5 to 24.9 kg/m^2 result was similar in both groups.

Table 4: Mode of delivery of the study participants, (n=100).

Mode of delivery	Group A, (n=50) (%)	Group B, (n=50) (%)	P value
NVD	43 (86)	45 (90)	0.891
Instrumental delivery	5 (10)	3 (6)	
LSCS	2 (4)	2 (4)	
Total	50 (100)	50 (100)	

P value was determined by Fisher Exact test.

The 86% of group A and 90% of group B participants had normal vaginal delivery, whereas 4% participants in each group underwent LSCS. 10% of group A and 6% of group B had instrumental delivery. No significant difference was found between both groups regarding mode of delivery.

Table 5: Neonatal outcome among both groups, (n=100).

Birth history of neonates	Group A, (n=50) (%)	Group B, (n=50) (%)	P value
Male	31 (62)	29 (58)	0.838 (C)
Female	19 (48)	21 (42)	
Weight (in kg)	2.86±0.27	2.88±0.26	0.684 (t)
APGAR score at 1 min	8.66±0.87	8.80±0.83	0.414 (t)
APGAR score at 5 min	9.66±0.68	9.74±0.59	0.537 (t)

P value was determined by (C) Chi-square test and (t) independent sample t test.

No significant difference was found between both groups regarding neonatal outcome.

DISCUSSION

The use of anesthesia during labour was a topic of religious controversy. Then, in 1950, neuraxial procedures were employed for labour pain treatment.[17] Although several

techniques and medications have been created to lessen this discomfort, LEA continues to be the most popular technique for pain management during delivery. Some studies assessing labour times and outcomes in relationship with epidural analgesia reported that epidural analgesia may increase labour times.[18,19] The mean age group of the women in our study was 22.4±4.5 years in group A and 22.9±5.2 years in group B. Majority of the women were aged below or equal 30 years among both groups. This is comparable to study conducted by Deshmukh et al where the mean age of the patients was 21.96±3.07 years in study group and 21.90±3.20 years in control group.[1] Another study conducted by Deepak et al also had patients with the mean age of 21.83±2.61 years and 21.54±4.06 years in the study and control, respectively.[20]

In the present study mean gestational age of participants was 38.2±1.3 weeks in group A and 38.1±1.2 weeks in group B. Majority of the participants were between 37 to 40 weeks of gestational age. In the study of Deshmukh et al, the mean gestational age was 38.46 weeks in control group and 38.44 weeks in study group.[1]

In this study, in group A, 66% patients were nullipara and 34% patients were multipara whereas in group B, 60% patients were nullipara and 40% patients were multipara. Parity was statistically similar in both group A and B. Similarly in the study of Papalkar et al majority of the patients were primigravida in both group A and B.[6]

In the present study, mean BMI of the participants was 24.8±2.5 kg/m^2 in group A and 24.7±2.2 kg/m^2 in group B. This result was consistent with the previous study of Deshmukh et al where mean BMI of patients in control group was 22.35 and that in study group is 21.98.[1] No significant difference was found in BMI between two groups.

In the present study, 43 (86%) patients of group A and 45 (90%) patients of group B had spontaneous vaginal delivery, 5 (10%) patients in group A and three (6%) patients in group B had instrumental delivery, two (4%) patients in each group underwent lower segment cesarean section (LSCS). In the present study, there was no significant increase in the rates of instrumental delivery or cesarean section (p=0.715). The results of our study were comparable to the study of Deshmukh et al which showed that the instrumental delivery rates were not increased with epidural anesthesia in labour.[1] However, Anwar et al reported an increased rate of forceps delivery in patients receiving epidural analgesia (54%).[16] This observation may be related to higher concentrations of local anesthetic agents used in earlier days with intermittent boluses which resulted in significant motor blockade. This may further decrease maternal mobility and reduce maternal effort in the second stage. It may also predispose to inadequate rotation of the foetal presenting part secondary to relaxation of pelvic floor muscles resulting in higher rates of instrumental deliveries.

In this study, a total of four LSCS was done (two in each group) in the second stage of labour. These patients underwent LSCS due to labour dystocia, failure of instrumental delivery and foetal malposition. In the study of Deshmukh et al total of seven LSCS were done (four in the control group and three in the study group).[1] Three patients in the control group underwent LSCS due to prolonged second stage of labour (DTA), and only one patient had DTA in the study group who underwent LSCS.[1] Naito et al observed that the use of LEA increased the rate of assisted vaginal but not the rate of cesarean section and the difference in the rates of the cesarean section between groups was 4.1%.[8] Although obstetricians adhered to the regulations that precisely define the circumstances in which an aided vaginal delivery or cesarean section should be performed, there are some variations in clinical practice between different providers.

In this study, APGAR score at 1 minute and 5 minute was 8.66±0.87 and 9.66±0.68 in group A and 8.80±0.83 and 9.74±0.59 in group B. No significant differences were found between both groups regarding, gender, birth weight, and APGAR score among both groups. In the study of Deepak et al 1 minute APGAR score was found to be lower in the study group but the APGAR at 5 minute in the two groups did not show any significant difference.[20] Cochrane review by Anim-Somuah et al also found no differences between groups in neonatal outcomes in terms of Apgar score at 5 minute.[17] Naito et al also observed the outcomes of the neonates and found there were no clinical differences between the two groups.[8]

Limitations

Although optimal care had been tried by the researcher in every step of the study, but there were some limitations: Study was conducted in a selected hospital. So, the study population might not represent the whole community. Due to time constraints small sample size was taken in this study The sample was taken purposively. So, there may be chance of bias which can influence the results. The study and follow-up period were short in comparison to other studies.

CONCLUSION

This study evaluated the effects of epidural analgesia on the mode of delivery. According to the present study findings, no significant increase in the incidence of instrumental or operative delivery was observed. Besides there was no adverse effect on neonatal outcome. Hence, epidural labour analgesia can be implemented as a safe and effective method of pain relief during labour where facilities are available.

Recommendations

Epidural labour analgesia can be safely recommended as a method of labour analgesia when the prerequisites are fulfilled. Larger well designed multicenter randomized

control trial with longer follow up is recommended to validate this finding.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Deshmukh VL, Ghosh SS, Yelikar KA, Gadappa SN. Effects of epidural labour analgesia in mother and foetus. J Obstetr Gynecol India. 2018;68(2):111-6.
2. Sahu RR, Shivgan SM. To study the effect of epidural analgesia on second stage of labor and mode of delivery. Indian J Obstet Gynecol Res. 2018;5(4):553-8.
3. Srebnik N, Barkan O, Rottenstreich M, Ioscovich A, Farkash R, Rotshenker-Olshinka K, et al. The impact of epidural analgesia on the mode of delivery in nulliparous women that attain the second stage of labor. J Maternal-Fetal Neonatal Med. 2019;33(14):1-7.
4. Munro A, George RB, Allen VM. The impact of analgesic intervention during the second stage of labour: a retrospective cohort study. Can J Anesthes. 2018;65(11):1240-47.
5. Lee L, Dy J, Azzam H. Management of Spontaneous Labour at Term in Healthy Women. J Obstetr Gynaecol Canada. 2016;38(9):843-65.
6. Papalkar J, Shrivastava D, Hariharan C. Epidural analgesia in labour. Int J Biological Med Res. 2013;4(1):2707-12.
7. Paddalwar S, Papalkar J, Shrivastava D, Chandak A, Nagrale M. A randomized, double-blind, controlled study comparing Bupivacaine 0.125% and Ropivacaine 0.125%, both with Fentanyl 2 µg/ml, for labor epidural analgesia. Indian J Pain. 2013;27(3):147.
8. Naito Y, Ida M, Yamamoto R, Tachibana K, Kinouchi K. The effect of labor epidural analgesia on labor, delivery, and neonatal outcomes: a propensity score-matched analysis in a single Japanese institute. JA Clin Rep. 2019;5(1):40.
9. Silva M, Halpern SH. Epidural analgesia for labor: Current techniques. Local Regional Anesthes. 2010;3:143-53.
10. Sodha S, Reeve A, Fernando R. Central neuraxial analgesia for labor: an update of the literature. Pain Management. 2017;7(5):419-26.
11. Wassen M, Smits LJM, Scheepers HCJ, Marcus MAE, Neer J, Van Nijhuis JG. Routine labour epidural analgesia versus labour analgesia on request: a randomized (Ivd). BJOG. 2015;122(3):344-50.
12. Ashagrie HE, Fentie DY, Kassahun HG. A review article on epidural analgesia for labor pain management: A systematic review. Int J Surg Open. 2020;24:100-104.
13. Wang T, Sun S, Huang S. Effects of Epidural Labor Analgesia with Low Concentrations of Local Anesthetics on Obstetric Outcomes: A Systematic Review and Meta-analysis of Randomized Controlled Trials. Anesthesia Analgesia. 2017;124(5):1571-80.
14. Sultan P, Murphy C, Halpern S, Carvalho B. The effect of low concentrations versus high concentrations of local anesthetics for labour analgesia on obstetric and anesthetic outcomes: a meta-analysis. Can J Anesthes. 2013;60(9):840-54.
15. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. Cochrane Database Syst Rev. 2011:(12):CD000331.
16. Anwar S, Anwar MW, Ahmad S. Effect of epidural analgesia on labor and its outcomes. J Ayub Med Coll Abbottabad. 2015;27(1):146-50.
17. Anim-Somuah M, Smyth RM, Cyna AM, Cuthbert A. Epidural versus non-epidural or no analgesia for pain management in labour. Cochrane Database of Systematic Reviews. 2018;(5):CD000331.
18. Indraccolo U, Ripanelli A, Di Iorio R, Indraccolo SR. Effect of epidural analgesia on labor times and mode of delivery: A prospective study. Clin Experimental Obstetr Gynecol. 2012;39(3):310-13.
19. Cheng YW, Hopkins LM, Caughey AB. How long is too long: Does a prolonged second stage of labor in nulliparous women affect maternal and neonatal outcomes? Am J Obstetr Gynecol. 2004;191(3):933-8.
20. Deepak D, Kumari A, Mohanty R, Prakash J, Kumar T, Priye S. Effects of epidural analgesia on labor pain and course of labor in primigravid parturients: a prospective non-randomized comparative study. Cureus. 2022;14(6):1-8.

Cite this article as: Khatun M, Rahim MA, Rahman F. Evaluation of the effects of epidural labour analgesia on mode of delivery. Int J Reprod Contracept Obstet Gynecol 2024;13:837-41.