International Journal of Reproduction, Contraception, Obstetrics and Gynecology
Syed AB et al. Int J Reprod Contracept Obstet Gynecol. 2023 Dec;12(12):3491-3497
www.ijrcog.org
pISSN 2320-1770 | eISSN 2320-1789

DOI: https://dx.doi.org/10.18203/2320-1770.ijrcog20233623

Original Research Article

A study to determine the effects of epidural analgesia in labour and to assess its maternal and neonatal outcome

Anam B. Syed*, Deepali S. Kapote

Department of Obstetrics and Gynaecology, Lokmanya Tilak Municipal General Hospital and Medical College, Sion Mumbai, Maharashtra, India

Received: 24 September 2023
Revised: 31 October 2023
Accepted: 02 November 2023

***Correspondence:**
Dr. Anam B. Syed,
E-mail: bs_anam@yahoo.com

ABSTRACT

Background: There is widespread acceptance of epidural analgesia among many physicians and patients, but disagreement remains regarding the effect of intrapartum epidural analgesia on the subsequent progress of labour and the mode of delivery. This study was designed to look and assess the effects of labour analgesia on maternal and fetal outcomes.
Methods: This is an observational prospective cohort study where 60 parturient visiting the hospital in labour during the study period who fulfilled the eligibility criteria & gave written informed consent for the participation were included as cases. Another 60 parturient visiting the hospital during the same period who also fulfilled the eligibility criteria and consent for the same were included as controls. After test dose of 3 ml of 2% lignocaine with 1:2,00,000 adrenaline, an initial bolus of 10 ml of 0.1% Ropivacaine+1microgram/cc Fentanyl is given.
Results: Epidural analgesia gave better pain relief when the VAS scores of the two groups were compared. No effect on increase of Caesarean or instrumental delivery rates was observed. Even though the first stage of labour was prolonged and the second stage shortened, the overall time of active stage of labour remained the same in both groups. No adverse neonatal outcome was seen with respect to epidural analgesia.
Conclusions: Epidural analgesia provided excellent pain relief for most of the women delivering at our institute & is associated with high patient satisfaction.

Keywords: Visual analogue score, Epidural analgesia, Maternal outcome, Neonatal outcome

INTRODUCTION

"The delivery of an infant into the arms of a conscious and pain-free mother is clearly one of the most exciting and gratifying moments in the life of an obstetrician" is a famous quoted by Moir.[1] Providing effective and safe analgesia during labour has always remained a challenge. The era of obstetric anaesthesia began with the concept of "etherisation of labour" by Simpson and progressed to use of chloroform by John Snow to Britain's Queen Victoria and thence to neuraxial techniques which came in the 1950s. since then, there have been several advances that have led to comprehensive and evidence-based management of labour pain.[2]

Growing knowledge about the physiology and pharmacotherapy of pain and the development of obstetric anaesthesia as a subspecialty has led to an overall improvement in the quality pain relief during labour.[3] In fact, the availability of regional anaesthesia for labour is considered nowadays as a reflection of standard obstetric care.[4] The primary goal is to provide adequate analgesia

for labour without significant side effects. The advantages of this are manifold firstly, the mother doesn't lose the urge to bear down and retains the ability to push during the second stage; secondly, there is no loss of bladder sensation and hence, post-partum urinary retention can be avoided; thirdly, long term post-partum blockade can be reduced; and lastly, but most importantly, there is increased maternal satisfaction. Thus, overall, the obstetric outcome is improved.

The American college of obstetricians and gynaecologists (ACOG) states: 'Labour results in severe pain for many women. There is no other circumstance where it is considered acceptable for a person to experience untreated severe pain, amenable to safe intervention, while under a physician's care'.[6,7] In the absence of a medical contraindication, maternal request is a sufficient medical indication for pain relief during labour.[5] Safe fetal outcome without any unfavourable maternal effect is the primary goal of pain relief during labour and epidural analgesia is the most efficient and widely employed modality for this. The management of epidural analgesia during labour has changed over the past two decades. The addition of neuraxial opioids (such as fentanyl) to local anesthetics allow adequate labour analgesia with very dilute solutions of local anesthetics, thus minimizing potential side effects on the progress of labour and lower extremity motor block. Considering the colossal benefits of epidural analgesia, this study has been taken up in our tertiary care centre to provide pain-free delivery (since it is not widely available in government set-up). Other benefits also include study of pain relief of patients in labour and raising the quality of available care.

Aim and objectives

Aim of the study was to determine the effects of epidural analgesia in labour and assess its maternal and neonatal outcome and objectives were; To determine the level of maternal pain relief during labour with VAS (Verbal Analogue Score), To evaluate the incidence of operative/instrumental delivery with epidural analgesia, To assess the duration of labour with epidural analgesia and To study neonatal outcomes using APGAR score.

METHODS

Present study is a hospital-based study to determine the effects of Epidural Analgesia in labour and its maternal and neonatal outcome in tertiary care hospital during the period of 3 years.

Study design, population and location

This was an observational prospective cohort study carried out in the department of Obstetrics and Gynaecology in a tertiary care hospital between May 2018 to Dec 2020. The study subjects participating in the study were are parturient in labour fulfilling the eligibility criteria and given written informed consent for the participation in the study. The study was conducted at labour room of department of obstetrics and gynaecology in a tertiary care hospital.

Inclusion criteria

Inclusion criteria were; Primigravida 23-25 years of age with 37 completed weeks of gestation full term with cephalic presentation in a single term pregnancy in active labour.

Exclusion criteria

Exclusion criteria were; High risk pregnancy like gestational diabetes mellitus, pre-eclampsia, heart disease in pregnancy, thrombocytopenia in pregnancy, Local site infection, spinal deformity, bleeding disorder, Maternal hypovolemia, Raised Intracranial tension and Patient refusal to consent.

Procedure of epidural anaesthesia

After valid written informed consent taken parturient is shifted inside on operation table. Monitors attached and vitals were noted. Patient given sitting position and parts scrubbed painted and draped Under all aseptic precautions a multi orifice catheter with micro bacterial filter is placed in L3-L4 or L4- L5 inter vertebral space using loss of resistance technique by the anaesthetist. After test dose of 3 ml of 2% lignocaine with 1:2,00,000 adrenaline, an initial bolus of 10 ml of 0.1% Ropivacaine+1microgram/cc Fentanyl is given. VAS assessed after 15 minutes. The epidural catheter inserted by anaesthetist was removed immediately postdelivery. Maternal factors like Patient's name age & Obstetric factors like obstetric history, gestational age of the foetus, cervical dilatation was noted. Duration of 1st & 2nd stage of labour, Mode of delivery (normal vaginal/operative vaginal/caesarean) & neonatal outcome (NICU admission yes/no) was noted. Adverse effects of epidural (nausea, vomiting & shivering) if any was noted.

Sample size

A total of 60 parturient who visited to the hospital during in labour during the study period who opted for epidural analgesia and who were fulfilling the eligibility criteria and given written informed consent for the participation in the study were included as cases. Another total of 60 parturient who visited to the hospital during the study period who were fulfilling the eligibility criteria and given written informed consent for the participation in the study were included as controls.

This is an observational prospective cohort study which was conducted in a tertiary care hospital. The sample size for this study was calculated by the proportion/prevalence in previous studies as per various studies conducted in India, prevalence of people opting for epidural anaesthesia

is around 10-15%. Sample size was calculated using the following formula:

$$n = z * z * pq/l * l\ (i.e., z2\ x\ pq/l2)$$

z=95% confidence interval=2, p=prevalence=12%, q=100-p=88%, l=allowable error=10%. Thus, sample size was calculated to be n=42. Taking into consideration 10% drop out rate due to failure to follow up and denial to complete the procedure after giving consent, a total of 60 parturient receiving epidural analgesia for labour pain were included in this study. Sampling method used was 'Convenient consecutive consenting sample.

Statistical analysis

Results of categorical measurements was measured as number (%). Chi-square test was used to measure the association and Mann-Whitney U test was used to measure the difference in the various parameters among cases and controls.

RESULTS

The study group comprised 120 nulliparous parturient. Of the 120 parturient, 60 formed group I i.e., all the parturient who received epidural analgesia in labour and the remaining 60 formed group II which comprised of all the nulliparous parturient in spontaneous labour who did not receive epidural analgesia.

Table 1: The distribution of the study participants based on age groups.

Age groups (years)		Groups		Total
		Group I (Cases)	Group II (Control)	
19-24	N	33	24	57
	%	55	40	47.5
25-30	N	27	36	63
	%	45	60	52.5
Total	N	60	60	120
	%	100	100	100
Mean±SD		23.80±2.92	24.81±2.93	p=0.06 NS

Mann-Whitney U test; * Statistically significant; p<0.05; NS- not significant.

The age of the patient varies between 19 and 30 years in both groups with a mean age 23.80 years in epidural group and 24.81 years in non-epidural group. Majority of the study participants were in the age group of 25-30 years. There was no statistically significant difference between the mean age of cases and controls.

The (Table 2) illustrates the distribution of the study participants based on gestational age. Majority of the study participants had gestational age of 37-39 weeks. There was no statistically significant difference between the mean gestational age of cases and controls. The (Table 3) illustrates the comparison of the mean duration of first stage in both the groups.

Table 2: Distribution of the study participants based on gestational age.

Gestational age (weeks)		Groups		Total
		Group I (Cases)	Group II (Control)	
37-39	N	33	30	63
	%	55	50	52.5
39.1-42	N	27	30	57
	%	45	50	47.5
Total	N	60	60	120
	%	100	100	100
Mean±SD		38.83±1.11	38.92±1.13	p=0.81 NS

Table 3: Comparison of the mean duration of first stage in both the groups.

Groups	Duration of first stage (minutes), Mean±SD	P value
Group I (Cases) N=60	225.75±89.11	0.01*
Group II (Control) N=55	286.73±134.58	

Mann-Whitney U test; * Statistically significant; p<0.05

Table 4: Comparison of the mean duration of second stage in both the groups.

Groups	Duration of second stage (minutes), Mean±SD	P value
Group I (Cases) N=60	42.50±12.96	0.0*
Group II (Control) N=52	22.52±11.74	

Mann-Whitney U test; * Statistically significant; p<0.05

Table 5: Comparison of the mean duration of active stage in both the groups.

Groups	Duration of active stage (minutes), Mean±SD	P value
Group I (Cases) N=60	268.25±96.32	0.09 NS
Group II (Control) N=52	308.02±135.03	

Mann-Whitney U test; * Statistically significant; p<0.05; NS- not significant.

The mean duration of first stage was higher in the Group II (Control) as compared to Group I (Cases). An average duration of 61 mins was found between the two groups. This difference was proven statistically significant. The (Table 4) illustrates the comparison of the mean duration of second stage in both the groups. The mean duration of

second stage was higher in the Group I (cases) by 20 mins±1.22 as compared to Group II (controls).

Table 6: Comparison of the mean VAS scores in both the groups.

Groups	VAS scores, Mean±SD	P value
Group I (Cases)	5.12±1.28	0.0
Group II (Control)	8.37±1.09	

Mann-Whitney U test; * Statistically significant; p<0.05

Table 7: Distribution of the study participants based on mode of delivery.

Mode of delivery		Groups		Total
		Group I (Cases)	Group II (Control)	
Forceps	**N**	3	2	5
	%	5	3.33	4.16
FTND	**N**	54	47	101
	%	90	78.33	84.16
LSCS	**N**	3	11	14
	%	5	9.2	11.66
Total	**N**	60	60	120
	%	100	100	100

Table 8: Distribution of the study participants based on indication of caesarean section (LSCS).

Indications		Groups		Total
		Group I (Cases)	Group II (Control)	
Arrest in second stage	**N**	1	1	2
	%	0.8	0.8	1.7
Foetal distress	**N**	2	2	4
	%	1.7	1.7	3.3
Foetal distress in second stage	**N**	0	1	1
	%	0.0	0.8	0.8
MSAF	**N**	0	3	3
	%	0.0	2.5	2.5
Non progress of labour	**N**	0	2	2
	%	0.0	1.7	1.7
Thick MSAF	**N**	0	1	1
	%	0.0	0.8	0.8
Thick MSAF with foetal distress	**N**	0	1	1
	%	0.0	0.8	0.8
Total	**N**	3	11	14
	%	5	18.33	11.66

This difference was a statistically significant. The (Table 5) illustrates the comparison of the mean duration of active stage in both the groups. The mean duration of active stage was higher in the Group II (Control) that is 308.02 mins as compared to Group I (Cases) with a mean duration of 268.25 minutes. But the overall difference was not found to be statistically significant.

Table 9: Distribution of the study participants in Group I based on side effects.

Side effects		Group I (Cases)
Nausea	**N**	2
	%	3.3
Backpain	**N**	3
	%	5.0
Headache	**N**	1
	%	1.7
Pain at puncture site	**N**	2
	%	3.3
Shivering	**N**	2
	%	3.3
Total	**N**	10
	%	16.66

Table 10: Distribution of the study participants based on NICU admissions.

NICU admissions		Groups		Total
		Group I (Cases)	Group II (Control)	
No	**N**	57	53	110
	%	47.5	44.2	91.7
Yes	**N**	3	7	10
	%	2.5	5.8	8.3
Total	**N**	60	60	120
	%	50	50	100

The (Table 6) illustrates the comparison of the mean VAS scores in both the groups. The mean VAS scores were higher in the Group II (Control) which was 8.37 as compared to Group I (Cases) which was 5.12. There was a statistically significant difference seen. The (Table 7) illustrates the distribution of the study participants based on mode of delivery. Majority of the study participants had FTND as mode of delivery followed by LSCS and forceps.

The (Table 8) illustrates the distribution of the study participants based on indication of section (LSCS). The most common indication amongst cases was fetal distress and that amongst the controls was MSAF. The (Table 9) illustrates the distribution of the study participants in Group I based on side effects. There were 10 study participants (16.66%) in Group I (Cases) with side effects. Most common side effect observed was backpain. The (Table 10) illustrates the distribution of the study participants based on NICU admission. There were 3 study participants who had NICU admission in Group I and 7 study participants who had NICU admission in Group II. There was no statistically significant association found

between the two groups and NICU admission.

DISCUSSION

There is a general consonance that a patient in labour should be given the option to have an epidural block for pain management. Despite this unanimity, there are differences in practice patterns as to when to initiate an epidural and how to minimize its impact on the duration and outcome on a patient's progress of labour. A review of the literature suggests conflicting results on whether epidural analgesia prolongs stages of labour, increases instrumental and caesarean delivery rates which is the most often discussed controversy associated with epidural analgesia. In current study 60 patients who requested epidural analgesia in labour were studied and compared with another 60 patients who did not require epidural analgesia for pain relief in labour. The most common age group in both groups combined was between 25-30 years as shown in (Table 1). The maximum number of patients was in the gestational age 37-39 weeks in both the groups as seen in (Table 2). Many studies have found that epidural analgesia as compared with systemic opioid analgesia or no analgesia is associated with a prolonged first stage of labour while some studies showed no effect on first stage.

Table 11: Few studies comparing the drugs used and their effect on first stage of labour.

Study	Year	Drugs used	First stage of labour
Thorp et al	1993	Bupivacaine 0.25% bolus dose followed by 0.25% Bupivacaine infusion	Prolong
Wong et al	2005	Intrathecal fentanyl or systemic hydromorphone	Shortened
Fyneface-Ogan et al	2009	0.125% plain bupivacaine	Shortened
Agarwal et al	2014	Bolus injection of 10 ml of ropivacaine	Shortened
Current study	2018	0.1%ropivacaine plus 1 microgram/cc of fentanyl	Shortened

In current study, the duration of first stage of labour was shortened in epidural group as compared to control group. The studies done by Wong et al in and Fyneface-Ogan et al stated that epidural analgesia was associated with shorter first stage of labour as was noted in current study (Table 3, Figure 3).[8,9] Short duration of first stage may be because of better analgesia with epidural resulting to decrease inhibitory effect of catecholamines on uterine contractility hence faster cervical dilatation. Epidural analgesia in our study was given after cervical dilatation of 4 cm onwards.[10]

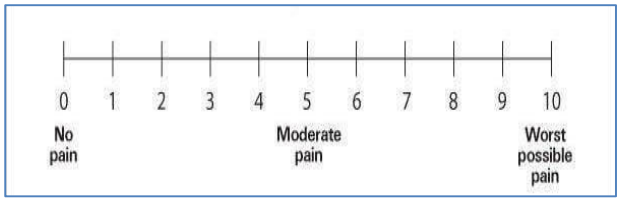

Figure 1: VAS scoring scale.

American College of Obstetrician and Gynaecologists recommends that "When feasible, obstetrician should delay the administration of epidural analgesia in nulliparous parturient until the cervical dilatation reaches at least 4 cm. The claimed association of epidural analgesia with prolonged delivery has long been attributed to motor blockade with concomitant weakness of pelvic floor muscles that reduces the effective maternal pushing and the involuntary bearing down reflex, however this is not the case when dilute anaesthetics are used where motor blockade is negligible.[11,12] Anim-Souman and colleagues performed a Cochrane review of epidural analgesia effects in labour using 38 trials involving 9658 parturient.[13]

Although there were no significant differences in the length of the first stage of labour, second stage was lengthened by an average 15 minutes. This is comparable to our study in which there was prolongation of second stage of labour in epidural group as compared to control by an average of 20±10 mins. The result of present study also correlated with the study done by Sahu et al, Agarwal et al, Rimaitis et al and Mousa et al.[14-16] However, the clinical significance of such a limited prolongation is debatable Several retrospective studies consistently demonstrated an association between epidural analgesia and increased durations of second stages of labour, but few randomized, prospective studies could not find any significant relation regarding the effects of epidural analgesia on the duration of labour as compared to non-epidural analgesia. Prolonged labour seems to occur more frequently when a higher dose of local anaesthetic agent is used.[17] However, the total mean duration of active stage of labour, although is prolonged in controls as oppose to cases by merely 39.77 minutes, the statistical difference of the same remains insignificant. Hence concluding that epidural analgesia overall has no effect on active stage of labour. These heterogeneous results on labour could be because of difference in labour management and analgesic administration protocol. In the same Cochrane review, 23 randomized trials (n=7935) were analysed comparing operative (forceps or vacuum-assist) deliveries in relation to epidural analgesia.[17] The result of present study also correlated with the study done by Sahu et al, Agarwal et al, Rimaitis et al and Mousa et al.[14-16] However, the clinical significance of such a limited prolongation is debatable. Several retrospective studies consistently demonstrated an association between epidural analgesia and increased durations of second stages of labour, but few randomized, prospective studies could not find any significant relation

regarding the effects of epidural analgesia on the duration of labour as compared to non-epidural analgesia. Prolonged labour seems to occur more frequently when a higher dose of local anaesthetic agent is used.[18] However, the total mean duration of active stage of labour, although is prolonged in controls as oppose to cases by merely 39.77 minutes, the statistical difference of the same remains insignificant. Hence concluding that epidural analgesia overall has no effect on active stage of labour. These heterogeneous results on labour could be because of difference in labour management and analgesic administration protocol. In this study, no statistically significant difference was found between epidural group and control group when comparing the rate of caesarean sections, instrumental vaginal (forceps or vacuum assisted) deliveries and normal vaginal deliveries. VAS score for pain consisted of a 10 cm line, zero representing 'no pain' and 10 representing 'worst pain'. patients who received epidural analgesia had less VAS score than the patient who did not demand epidural analgesia. Perception of pain in EA group was very low.

Two women in the epidural group had caesarean section due to fetal distress and one woman had arrest in second stage of labour and their pain score was also included. About 17 i.e.,28.33% women in the epidural group had VAS scores less than 4 as compared to none in women who did not receive epidural analgesia. In present study there was no statistically significant difference seen in the Apgar score of the new-borns at 1 min and 5 min in both the groups. This was indicated by the normal range of APGAR score of 7-10, the absence of need for mechanical ventilation for the neonates. This result was similar to the study conducted by Sahu et al and Agarwal et al.[16] There were 3 neonates who required NICU admission in Group I (cases), of which 1 was for in view of fetal distress and other 2 in view of Thick MSAF for observation. There was no significant increase in NICU admission comparable in both groups, thus demonstrating a decent neonatal outcome. Of the 60 parturient who received epidural in labour in the current study, around 10 of them had some undesirable effects after receiving epidural analgesia. While most common side effect was backpain which was observed in 3 (5%) women other commonly observed side effects seen were nausea 3.3%, shivering 3.3% and pain at puncture site 3.3%. Headache was observed in only 1 parturient receiving epidural. It was observed that these side effects resolved over a period of 24 hours after removing the epidural catheter and there were no residual complaints that persisted beyond 24 hours in any of these patients.

Limitations

This study has some limitations; firstly, pain perception varies from person to person, hence can create a bias in assessing complete analgesic effect of epidural analgesia. Also, a larger sample size would have more statistical implications with respect to current study.

CONCLUSION

Childbirth is considered as one of the most vital events in a woman's life, and it can,in turn, affect the rest of her life, both physically and emotionally. In this observational prospective cohort study, we found that the patients who received epidural analgesia, the first stage of labour was shortened. The incidence of instrumental deliveries and caesarean section were not found to be increased in patients who received epidural analgesia. The pain relief assessed by verbal analogue scale was found to be significantly reduced with epidural analgesia. The neonatal outcome on basis of APGAR scores and NICU admission were not found to be increased in epidural group. Hence, we conclude that epidural labour analgesia is effective for most of the women delivering at our institute and it is associated with high patient satisfaction.

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

REFERENCES

1. Kinsella SM. Epidural analgesia for labour and instrumental vaginal delivery: an anaesthetic problem with an obstetric solution?. BJOG. 2001;108(1):1-2.
2. Somerville MA. Structuring the issues in informed consent. McGill Law J. 1981;26:741-808.
3. Wang F, Shen X, Guo X, Peng Y, Gu X. Epidural analgesia in the latent phase of labor and the risk of cesarean delivery a five-year randomized controlled trial. Anesthesiol. 2009;111(4):871-80.
4. Slusarenko P, Nobel WH. Epidural anaesthesia: concerns regarding informed consent. Can Anaesth Soc J. 1985;32:681-2.
5. Anya SE. Maternal and Fetal Medicine. Pain Relief during Labor. Am Col Obstet Gynecol J. 1993;32:23-9.
6. Anim-Somuah M, Smyth R, Howell C. Epidural versus non-epidural or no analgesia in labour. Cochrane Database Syst Rev. 2005;4:331.
7. Howell C. Maternal and Fetal Medicine. Am Col Obstet Gynecol J. 1997;41:72-8.
8. Wong CA, Scavone BM, Peaceman AM, McCarthy RJ, Sullivan JT, Diaz NT,et al. The risk of caesarean delivery in neuraxial analgesia given early vs late in labour. N Engl J Med. 2005;352:655-65.
9. Fyneface-Ogan S, Mato CN, Anya SE. Epidural anesthesia: views and outcomes of women in labour in a Nigerian hospital. Ann Afr Med. 2009;8:250-6.
10. Goetzl LM. Clinical management guidelines for obstetrician-gyneclogist. Obstet Gynecol J. 2002;100: 177-91.
11. Mousa WF, Al-Metwalli RR, Mostafa M. Epidural analgesia during labor-0.5% lidocaine with fentanyl vs. 0.08% ropivacaine with fentanyl. Middle East J Anaesthesiol. 2010;20(4):521-7.
12. Thorburn J, Moir DD. Extradural analgesia: The

influence of volume and concentration of bupivacaine on the mode of delivery, analgesic efficacy and motor block. Br J Anaesthes. 1981;53(9):933-9.
13. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. Cochrane Database Syst Rev. 2011;3:331.
14. Mousa WF, Al-Metwalli RR, Mostafa M. Epidural analgesia during labor-0.5% lidocaine with fentanyl vs. 0.08% ropivacaine with fentanyl. Middle East J Anaesthesiol. 2010;20(4):521-7.
15. 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.
16. Agrawal D, Makhija B. The effect of epidural analgesia on labor, mode of delivery and neonatal outcome in Nullipara of India, 2011-2014. J Clin Diagn Res. 2014;8(10):3-6.
17. Anim-Somuah M, Smyth RM, Jones L. Epidural versus non-epidural or no analgesia in labour. Cochrane Database Syst Rev. 2011;10:331.
18. Olofsson C, Ekblom A, Ekman-Ordeberg G, Irestedt L. Obstetric outcome following epidural analgesia with bupivacaine-adrenaline 0.25% or bupivacaine 0,125% with sufentanil: A prospective randomized controlled study in 1000 parturients. Acta Anaesthesiol Scand. 1998;42:284-92.

Cite this article as: Syed AB, Kapote DS. A study to determine the effects of epidural analgesia in labour and to assess its maternal and neonatal outcome. Int J Reprod Contracept Obstet Gynecol 2023;12:3491-7.