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## Research Article

### Is EPIDURAL ANALGESIA EFFECTIVE ON MULTIPAROUS OR PRIMIPAROUS WOMEN? OUR FINDINGS ON LABOR ANALGESIA

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#### ABSTRACT

**Objective:** The aim of labor analgesia is to carry out a safe and painless labor without affecting the vigilance and motor functions of mother, progress of labor and health of infant.

**Design:** Retrospective study

**Setting:** Ordu University, Faculty of Medicine, Training and Research Hospital

**Subject:** Our study was conducted on 101 parturients with ASA I-II status and in whom labor began and vaginal delivery was planned.

**Intervention:** Between January 2016, June 2017, 101 cases were divided into 2 groups. A total of 101 cases including 63 primiparous and 38 multiparous women were enrolled in our study.

**Main Outcome Measures:** Demographic data, VAS (Visual analog scale) and VRS (Verbal Rating Scale) scores, motor block level, sensorial block level were recorded at the beginning, at 5th, 10th, 15th, 30th, 45th and 60th minutes and afterwards, at every half hour till the end of labor.

**Results:** An advanced level of positive correlation was detected between the final VRS score and final VAS score, labor duration, elapsed time between two doses, cervical dilatation ( $p < 0.001$ ). When the VAS score was assessed for the second time, again, an advanced level of positive correlation was found between the final VAS, that is, labor duration, total dose, elapsed time between two doses in terms of minutes, final cervical dilatation ( $p < 0.001$ ).

**Conclusion:** Epidural analgesia is a effective method of analgesia in labor analgesia. Given the increasing number of cesarean sections today, we suggest that encouraging pregnant women in painless labor will be quite beneficial.

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#### INTRODUCTION

Labor pain is usually very severe and is described as the most painful experience in life by the vast majority of women<sup>[1,2]</sup>. It was found to be more severe than chronic pain such as lumbar pain, cancer pain, phantom pain and postherpetic neuralgia and acute pain such as fracture and laceration<sup>[3]</sup>. The American Society of Anesthesiologists (ASA) and the American Academy of Obstetrics and Gynecology (ACOG) consider labor pain as an indication for treatment. It is known that well-performed analgesia reduce maternal mortality and morbidity and has beneficial effects on the fetus<sup>[4-7]</sup>.

The aim of labor analgesia is to carry out a safe and painless labor without affecting the vigilance and motor functions of mother, progress of labor and health of infant. The regional blocks provide the contribution of mother to the labor without affecting the consciousness of the patient and by eliminating the labor pain. Among the regional analgesia techniques performed for labor analgesia, there are epidural, spinal, and

combined spinal-epidural analgesia<sup>[8]</sup>. As the regional techniques relieve the pain emerging during labor, they also enable mother to contribute to labour physically and emotionally. This contribution is positive for both mother and infant<sup>[9]</sup>. Epidural analgesia is currently the best available method for obstetric analgesia<sup>[10,11]</sup>.

In this retrospective study, we present our experiences on epidural labor analgesia in primiparous and multiparous parturients who were in active labor, who had cervical dilatation  $\geq 4$  cm and who desired painless labor.

#### SUBJECTS AND METHODS

Our study was conducted on 101 parturients with ASA I-II status and cervical dilatation of 4 - 6 cm who were admitted to the Ministry of Health Ordu University Training and Research Hospital, Obstetrics and Gynecology Clinic, in whom labour began and vaginal delivery was planned. Ethical committee approval was obtained from Ordu University Clinical Research

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Ethics Committee before the study (2017/06). All pregnant women enrolled in the study were informed about the study, detailed information were given about the epidural analgesia and their written consents were obtained. Those who were not in term pregnancy (36 - 42 gestational week), who did not have vertex presentation and multiple pregnancies were excluded from the study. The preparation for the procedure was initiated for the parturients who were in active labor, had cervical dilatation of 4 - 6 cm and in whom cervical effacement was 50 - 70% when the visual analog scale (VAS) score was 2 - 3. In case of infection at the needle site, sepsis (fever with chills and rigor, hypotension), severe coagulopathy (low coagulation factors for long period of time and platelets less than 100.000 mm<sup>3</sup>), uncorrected hypovolemia (hypotension and ongoing hemorrhage), the patients were excluded from the study. Noninvasive arterial pressures, peak heart rate, oxygen saturations were monitored before the placement of epidural catheter. Respiratory rates were recorded. Fetal heart beats, uterine contractions were monitored by cardiotocograph throughout the labor. Prior to administering epidural analgesia, 10 mL/kg isotonic NaCl solution was infused intravenously for 30 minutes through the i.v line established with 20 G IV cannula on the dorsum of the hand. The epidural analgesia was performed in the sitting position in accordance with the necessary asepsis and antisepsis measures. After cleaning with appropriate antiseptic solution, infiltration anesthesia was performed by administering 2 ml of 2% lidocaine to the skin and subcutaneous tissue at the level of the L2-L3 / L3-L4 range. Epidural space was reached with 18 G Touhy needle using median approach and loss of resistance method. The epidural catheter was advanced in the cephalad direction. Upon not seeing blood or CSF with aspiration, the catheter was fixed so that 3 - 4 cm of it would stay in the epidural space. The portion of the catheter which stayed outside the skin was fixed from the back till the shoulder. The parturients were positioned with their head in 30 degrees and on left lateral position. Forty mg of 2% lidocaine containing 3 ml of test dose was administered through the catheter. After this procedure, we waited for 5 minutes and the procedure was resumed upon not observing motor block in the patient. After the epidural catheter was applied to the pregnant women, 10 ml of 0.2% bupivacaine and 50 mcg of fentanyl were administered through the epidural catheter when the VAS score was 4 and over. The demographic characteristics, age, weight, height, parity status (primiparous or multiparous) of the cases were recorded. The continuous monitorization of fetal heart rate was performed. After the analgesia was initiated, peak heart rate (PHR) of mother, systolic arterial pressure (SAB), diastolic arterial pressure (DAB), respiratory rate, fetal heart rate, VAS (Visual analog scale) and VRS (Verbal Rating Scale) scores, motor block level, sensorial block level were recorded at the beginning, at 5th, 10th, 15th, 30th, 45th and 60th minutes and afterwards, at every half hour till the end of labor. A 20% drop in blood pressure or a systolic arterial pressure of 90 mmHg were regarded as hypotension. When necessary, it was planned to administer 5 mg/ml via i.v. route. The amount of the first dose of labor analgesia (how many ml), time of second dose (how long after the first dose) and the total labor duration were recorded separately for each case. The VAS and VRS scores of the cases were recorded when the first dose and second dose were administered through the epidural catheter. The gender,

height, weight and head circumference of each newborn infant were recorded separately. VAS: Marked scale on 10-point line was used. The left side was referred to having no pain (0 point) and the right side was referred to unbearable pain (10 points). The patient was asked to show her pain on this line. Effective analgesia was considered to be provided in those with the VAS score of 3 and less. The levels of sensorial block were determined with the "pinprick" (pricking with the tip of needle) method. Sensory block was considered to develop in the lower extremities when numbness and hypoalgesia were felt between the dermatomes of L1 and S5. The cases were informed also about VRS. It was expressed as 0: no pain, 1: mild pain, 2: disturbing pain, 3: moderate pain 4: severe pain 5: very severe pain. The VAS and VRS scores were recorded when the first and second dose of epidural analgesia were administered.

The Kolmogorov-Smirnov test was applied to the data obtained in the study in order to check the hypothesis of normality ( $p < 0.05$ ). Then, Spearman rank correlation test was used in order to examine the associations among the measured values (head circumference of infant, weight, VRS, VAS, labor duration in minutes, total dose, etc.). Mann Whitney U test was used to determine whether there was difference or not between the two parity statuses in terms measured values. The differences between the first and last measurement scores of VRS and VAS in terms of parity statuses were determined by the Friedman test. The results of the study were expressed as n, mean, standard deviation, median, IQR, minimum and maximum values. The results were considered significant at the significance level of 0.05. All statistical calculations were carried out with SPSS package program 20.0 V.

## RESULTS

A total of 101 cases including 63 primiparous and 38 multiparous women were enrolled in our study. The relationship among the parameters was presented in Table 1. An advanced level of positive correlation was detected between the final VRS score recorded while administering the second dose through the epidural catheter and the final VAS score, labor duration, elapsed time between two doses, cervical dilatation ( $p < 0.001$ ). When the VAS score was assessed for the second time, again, an advanced level of positive correlation was found between the final VAS, that is, when the second epidural dose was administered, and duration of labour, total dose, elapsed time between two doses in terms of minutes, final cervical dilatation ( $p < 0.001$ ). There was also an advanced level of positive correlation of labour duration with total dose, interval duration in terms of minutes, final cervical dilatation ( $p < 0.001$ ). The findings of this positive correlation suggest that epidural analgesia in both groups (primiparous, multiparous) is a quite effective method (Table 1).

The mean and standard deviation values of the variables in both groups are shown in Table 2. The total dose administered through epidural catheter was found to be significant in favor of multiparous women ( $p = 0.002$ ). The labor duration was found to be statistically significant for both groups ( $p < 0.001$ ). Also, the elapsed time between two doses was found to be statistically significant for both groups ( $p = 0.005$ ). Similarly, the final VRS score was found to be statistically significant in both groups ( $p = 0.003$ ).

**Table 1** The relationships among the parameters

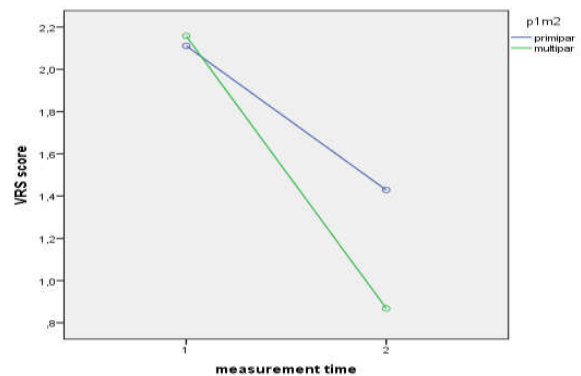
Parameters		Final VRS	Final VAS	Labor duration (How many minutes)	Total dose (ml)	Interval duration (How many minutes)	Final cervical dilatation
Baby weight (W)	$r_s$	0.038	0.037	0.120	0.013	0.045	0.040
	<i>p-values</i>	0.618	0.608	0.078	0.872	0.563	0.611
Head circumference of infant (cm)	$r_s$	0.045	- 0.083	0.146	- 0.101	0.049	- 0.079
	<i>p-values</i>	0.608	0.315	0.060	0.269	0.576	0.376
Final VRS	$r_s$		0.518	0.331	0.495	0.491	0.487
	<i>p-values</i>		<0.001	<0.001	<0.001	<0.001	<0.001
Final VAS	$r_s$			0.311	0.598	0.583	0.595
	<i>p-values</i>			<0.001	<0.001	<0.001	<0.001
Labor duration (How many minutes)	$r_s$				0.466	0.452	0.486
	<i>p-values</i>				<0.001	<0.001	<0.001
Total dose (ml)	$r_s$					0.838	0.881
	<i>p-values</i>					<0.001	<0.001
Interval duration (How many minutes)	$r_s$						0.785
	<i>p-values</i>						<0.001

**Table 2** The mean and standard deviation values of the groups

Parity	n	Mean	Std. Deviation	Median	IQR	min	max.	<i>p-values</i>
Total dose (ml)								
Primiparous	63	12.22	3.11	10.00	5.00	10	20	0.002
Multiparous	38	10.53	1.56	10.00	0.00	10	15	
Labor duration (How many minutes)								
Primiparous	63	166.48	98.00	133.00	125.00	60	545	<0.001
Multiparous	38	82.42	48.20	64.50	52.50	16	205	
Interval duration (How many minutes)								
Primiparous	63	50.63	72.95	0.00	100.00	0	295	0.005
Multiparous	38	8.63	25.08	0.00	0.00	0	100	
Final VRS								
Primiparous	63	1.43	0.87	1.00	1.00	0	3	0.003
Multiparous	38	0.87	0.81	1.00	2	0	2	
Final VAS								
Primiparous	63	2.81	1.95	2	4.00	0	8	0.100
Multiparous	38	2.08	1.58	2	2	0	5	
First VRS								
Primiparous	63	2.11	0.44	2	0.00	1	3	0.616
Multiparous	38	2.16	0.44	2	0.00	1	3	
First VAS								
Primiparous	63	4.89	0.76	5.00	1.00	4	6	0.420
Multiparous	38	4.92	1.26	5.00	2.0	1	6	
Height(cm)								
Primiparous	63	49.81	0.86	50.00	0.00	47	52	0.230
Multiparous	38	49.42	1.54	50.00	1.00	44	52	
Weight of infant								
Primiparous	63	3223.5	391.2	3230.0	415.0	2210	4440	0.750
Multiparous	38	3224.2	463.1	3275.0	595.0	2135	4100	
Head circumference of infant (cm)								
Primiparous	63	34.95	0.81	35.00	1.00	33	37	0.455
Multiparous	38	34.76	0.97	35.00	1.00	31	36	

These results, again, demonstrate to us the fact that epidural analgesia is an effective method for both primiparous and multiparous women.

A significant difference was detected in the VRS scores in terms of parity status (primiparous, multiparous)( $p = 0.012$ ). In this study, a significant drop was noted in the VRS scores of the multiparous women compared to the primiparous women. However, no significant difference was observed between the first and last measurement values for both parity statuses ( $p < 0.001$ ) (Table 3 and Figure 1). This finding indicates that VRS scores decreased more rapidly in the multiparous women than the primiparous women. In other words, epidural labor analgesia acts in much more shorter time in the multiparous women compared to the primiparous women (Figure 1).

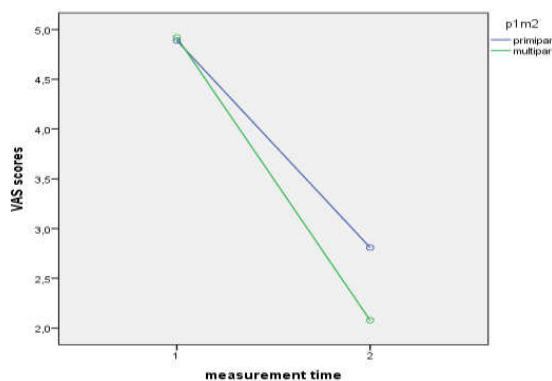


**Figure 1** VRS scores obtained at different measurement times for both parity statuses

**Table 3** VRS scores obtained at different measurement times for both parity statuses

Parity	First VRS		Final VRS		p-value for time
	Mean	SD	Mean	SD	
Primiparous	2.11	0.44	1.43	0.88	p<0.001
Multiparous	2.16	0.44	0.87	0.81	
Total	2.13	0.44	1.22	0.89	

There was no difference between the primiparous and multiparous women in terms of VAS scores (p = 0.116). However, when both parity statuses were considered, there was a significant difference between the first and final VAS scores (p < 0.001) (Table 4 and Figure 2). Again, as it is for the VRS scores, the statistical results for the VAS scores were in favor of multiparous women. The VAS scores also showed a more rapid decline in the multiparous women as in the VRS scores (Table 4, Figure 2). Labor analgesia provides more rapid comfort in terms of pain relief in multiparous women.



**Figure 2** VRS scores obtained at different measurement times for both parity statuses

**Table 4** VRS scores obtained at different measurement times for both parity statuses

Parity	First VAS		Final VAS		p-value for time
	Mean	SD	Mean	SD	
Primiparous	4.89	0.76	2.81	1.95	p<0.001
Multiparous	4.92	1.26	2.08	1.58	
Total	4.90	0.97	2.53	1.85	

## DISCUSSION

The epidural analgesia technique used to relieve labor pain is the most widely accepted technique since it provides continuous analgesia, it is effective in all periods of labor including the postpartum period, and it does not require any other anesthesia method if surgical interventions are needed<sup>[12]</sup>. The physiological response occurring in labor can lead to the depletion of the mother's energy reserves and even fatal complications during the puerperium period<sup>[10]</sup>. The concept of modern pain therapy in labor and pushing stage suggests that the ongoing severe pain and stress caused by pain should be eliminated effectively due to their hazardous effects on mother and probably on fetus. Good practice of analgesia was shown to reduce maternal mortality and morbidity in clinical trials<sup>[5,13]</sup>. In our study, also, maternal satisfaction was very high in the parturients in whom labor analgesia was performed.

With the widespread use of epidural analgesia in obstetrics, numerous studies were conducted to find the most safe and effective agents. Local anesthetics and opioids are widely used for this purpose. The clinical trials for finding the agents providing the best analgesia without causing adverse effects on the mother and fetus and without motor block, and the doses of these agents continue today. Recently, the most popular local anesthetics are bupivacaine, ropivacaine and levobupivacaine. Bupivacaine has been widely used for years as a preferred local anesthetic due to its advantageous pharmacological properties for mother and fetus. Having limited systemic circulatory absorption from the epidural space and restricted transition to fetus from placenta since it is highly bound to proteins are some of these advantages<sup>[14]</sup>. In our study, also, bupivacaine was used in diluted doses for labor analgesia.

Epidural opioids could not provide adequate analgesia alone in a various painful conditions. Therefore, they are commonly used in combination with local anesthetics in order to reduce motor block risk and provide adequate analgesia. We also used bupivacaine in combination with fentanyl for labor analgesia<sup>[15]</sup>.

Viitanen et al reported that adequate analgesia was obtained in 73% of patients and the action time of spinal analgesia terminated before delivery in 8% of the patients in their study in which they administered a single dose mixture of 2.5 mg bupivacaine and 25 µg fentanyl to 229 multiparous parturients for labor pain. N<sub>2</sub>O inhalation, paracervical block, epidural block or pudendal block were administered to the patients who required additional analgesia, depending on their conditions. They reported that pruritus developed in 64% of the patients, hypotension in 2% of them and fetal bradycardia in 7% of them<sup>[16]</sup>. In our study, no motor block at Bromage 2 level or no hypotension and fetal bradycardia were detected. This situation may be attributed to the low dose of bupivacaine that was used as local anesthetic solution. Also, unlike to the study by Viitanen *et al*, using epidural analgesia method instead of single dose spinal analgesia might be mentioned as an advantage. Since there was an epidural catheter, we could administer labor analgesia continuously and invasive interventions such as N<sub>2</sub>O inhalation or paracervical block were not needed.

Atiénzar *et al* divided 102 primiparous pregnant women into three groups. They administered 0.125% bupivacaine, 0.125% levobupivacaine, 2% ropivacaine and the solutions each of which included 1 µg/mL fentanyl at the rate of 8 ml/h through epidural catheter to the groups. Their VAS scores, motor and sensory block levels were monitored at one hour intervals and analgesia levels were found to be adequate for all groups (VAS < 40 mm). The VAS scores were detected to be higher in the levobupivacaine group than the other groups. The motor block was encountered more commonly in the bupivacaine group compared to the other groups. Other parameters were found to be similar in all three groups. Whereas in our study both primiparous and multiparous parturients were included in the study. Only, the second (final) measurements of VRS and VAS scores showed more rapid decline in the multiparous women. However, considering both our clinical observations and other statistical results, epidural labor analgesia was found to be an effective analgesia method for primiparous and multiparous

parturients. Our results were similar to those of Ati nzar et al and Viitanen et al<sup>[15]</sup>.

Single dose spinal anesthesia was administered to 48 multiparous parturients for labor analgesia in the study by Apilioglu et al. The cases received 2.5 mg of levobupivacaine and 15 mcg fentanyl intrathecally. Single dose spinal labor analgesia became successful in 43 of 48 cases whereas additional analgesia was required in 6 (12.5%) cases. Epidural catheter could not be placed in five cases due to the lack of time. It could be placed only in one case. However, in our study, the cases were both primiparous and multiparous and an epidural catheter was placed in all of them. Additional analgesic requirement during delivery were met successfully. Single dose spinal labor anesthesia that was administered by Apilioglu et al was partially successful only in the multiparous cases who had short first and second stage of labor. Whereas in our study, it provided an effective analgesia even in primiparous women in whom the first and second stages of labor were longer. It is obvious that epidural analgesia is more appropriate for labor analgesia<sup>[17]</sup>.

Does really epidural analgesia increase the number of assisted labor? Numerous studies investigating the effects of epidural analgesia on the incidence of assisted labor have been conducted. In the meta-analysis study by Halpern et al, they found no difference in terms of assisted labor incidence between the ropivacaine and bupivacaine groups<sup>[18]</sup>. Ati nzar et al investigated the effects of levobupivacaine, bupivacaine, and ropivacaine, and found that there was no difference in terms of the frequency of instrumented labor among the groups<sup>[15]</sup>. Similarly, in our study, no situation requiring instrumented labor occurred in the parturients to whom labor analgesia were administered in a similar fashion.

Possible complications of epidural analgesia include hypotension, nausea, vomiting, chills, pruritus and lumbar pain<sup>[19]</sup>. Some of these side effects occur due to the medications used and some depending on the technique used. In our study, in line with the literature, we did not observe a significant adverse effect in the parturients to whom labor analgesia was administered. Pruritus developed only in one case and it improved with anti-histaminic drug in a short time. Hypotension requiring vasopressor was observed in one case. No adverse effect occurred in any case other than these two cases.

## CONCLUSION

Epidural analgesia is a widely used and effective method of analgesia in labor analgesia. The goal of epidural analgesia should be to minimize or completely eliminate the side effects while providing effective analgesia. For this purpose, adding local anesthetics and low dose opioids is a good choice. Although our statistical results (in terms of VAS and VRS scores) were in favor of multiparous women, our clinical observational results showed that epidural analgesia was a successful analgesia method which did not increase the interventional labor rate in primiparous women. Therefore, if there is no indication for cesarean section, all pregnancies should be encouraged in painless labor and it should be preferred by both anesthetists and obstetricians in clinical practice. Given the increasing number of cesarean section

today, we suggest that encouraging pregnant women in painless labor will be quite beneficial.

## Acknowledgment

**Conflict of Interest:** No conflict of interest was declared by the authors.

**Ethics Committee Approval:** Clinical Studies Ethics Committee of Ordu University, Faculty of Medicine, June 2017

**Informed Consent:** Written informed consent was obtained from patients who participated in this study.

**Financial Disclosure:** The authors declare no financial support.

## Details Authors Contribution

1. Ahmet Gultekin: Concept, study design, conduct the study, data collection, analyze the data, literature review, write the manuscript
2. Canakci Ebru: Concept, study design, literature review, write the manuscript and final review
3. Bulent Hanedan: Concept, study design, analyze the data, statistical analysis

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