

## Effectivity of Walking Epidural Analgesia in Normal Labor to Reduce Labor Pain and Improve Neonatal Outcome

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### ABSTRACT

**Background:** In Indonesia itself, only 15% of 2,700 labor women felt the pain was tolerable, meanwhile 85% said the pain was moderate until unbearable. Usage of epidural anaesthesia for pain relief in labor is common but controversies still persist about its effect and side effect on labor process. Neuraxial block especially epidural also not yet well known in Indonesia.

**Objective:** This research aims to study maternal visual analogue scale (VAS) score changes before and after walking epidural anesthesia (WELA) and fetal outcome after birth.

**Methods:** This research is an experimental design with one pre-test and post-test group. Data was taken from Unggul Karsa Medika Hospital and Permata Hati Clinic medical records from 2017 until 2022. Ethical approval was approved by Unggul Karsa Medika Hospital Ethical Committee (003/KEP-LIT/III/2023). After that all of 450 patients' data was then analyzed by Wilcoxon with IBM<sup>®</sup> SPSS Statistic 26<sup>th</sup> with  $\alpha=0.05$ .

**Result:** Statistical analysis shows there was significant decrease of pain severity with initial VAS 7.58 to 3.37 after WELA procedure ( $p$  0.0001). APGAR scores of all the foetus were normal with no asphyxia present.

**Conclusion:** Our findings demonstrate the benefit of WELA for both of mother and fetus. was significantly decrease in VAS score during labor. Fetal outcome was also notably great after labour process and usage of epidural could decrease the risk of fetal acidemia and distress which reduce caesarean section rate. Usage of WELA in Indonesia could be encourage and recommended as an alternative to elective caesarean section.

**Keywords:** APGAR score; labour; pain; VAS; WELA

## INTRODUCTION

Since epidural anaesthesia was introduced in 1939 by Eugene Aburel for pain relief in labor, controversies still persist about its effect and side effect on labor process.<sup>1</sup> Labor itself characterized by forceful and painful uterine contractions that cause cervical dilation and descend of the fetus through the birth canal.<sup>2</sup> In preparation of labor, immune cells are localized to the cervix, and when the process starts, activation of neutrophils, proinflammatory M1 macrophages, and tissue repair M2 macrophages in the cervix is augmented which also contributes to the pain.<sup>2</sup> Later on cervical dilation, low uterine segment obliteration due to contraction and maternal pushing effort contributes to increasing labour pain.<sup>2,3</sup>

Pain itself by International Association for the Study of Pain (IASP) defines as unpleasant sensory and emotional sensations due actual or potential tissue damage.<sup>4</sup> Labor pain proves to be terrifying as the study performed by Najafi-Sharjabad *et al.* found 41.1% of pregnant opted for a caesarean section due to fear of labor pain and normal labor complications.<sup>5</sup> In Indonesia itself Rejeki *et al.* found that in 2,700 labor woman only 15% felt the pain was tolerable, meanwhile 85% said the pain was moderate until unbearable.<sup>6</sup>

Due to its intensity, method of intervention needs to be performed to reduce labor pain. Lumbar epidural considered most effective form of pain relief in labor with around 30% of laboring women in the UK and 60% in the USA receiving epidural analgesia.<sup>7</sup> Despite its popularity, doubt and concern arise due to epidural effect on labor such as prolong the labor phase which increase the risk of cesarean section.<sup>8,9</sup> Other methods than epidural to decrease

labor pain are other neuraxial analgesia such as spinal, intravenous analgesia and nerve block.<sup>9</sup> The main difference between spinal and epidural is when spinal inject the drug into subarachnoid space, epidural anesthesia inject the medicine in epidural space, a space that encase subarachnoid space.<sup>7-9</sup> Even with its popularity in high income country, neuraxial block especially epidural not yet well known in Indonesia as study perform in Yogyakarta stated most of the participants has not been acknowledged adequately to lumbar epidural anesthesia.<sup>10</sup> This founding encourage us to study the effect of walking epidural analgesia (WELA) on maternal labor pain and fetal outcome in West Java.

## METHOD

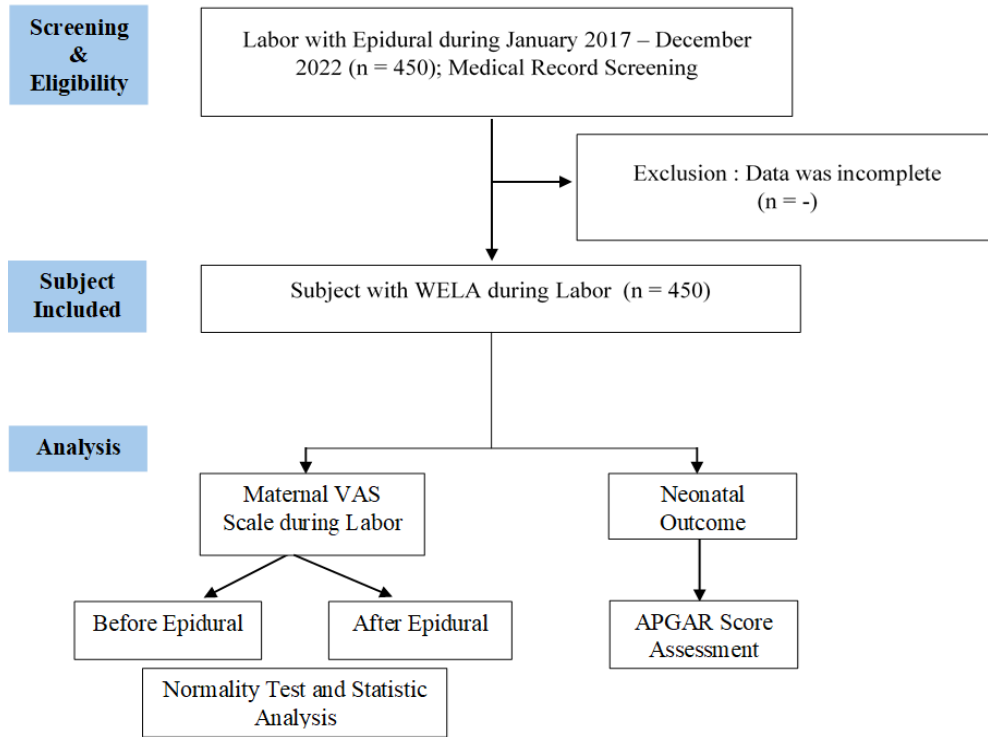
This study was a retrospective study which has experimental design with one pre-test and post-test group. Data was taken from Unggul Karsa Medika Hospital and Permata Hati Clinic medical records from 2017 until 2022. Ethical approval was approved by Unggul Karsa Medika Hospital Ethical Committee (003/KEP-LIT/III/2023). Inclusion criteria of this study are patient age within 20-35 years old, had vaginal labor with epidural anesthesia, and without comorbidities. Exclusion are the medical record without proper datas. Ropivacaine 0.125% was chosen with optimal sensory block and less motoric block so extremities motoric recovery is faster.

The data classified as pre-test and post-test, pre-test data defines as patient in labor condition before receives epidural anesthesia and post-test data defines as patient in labor after receiving anesthesia. Fetal outcome was measured by APGAR score at 1 and 5 minutes. Maternal visual analogue scale (VAS)

level was then analyzed by Wilcoxon with IBM® SPSS Statistic 26th with

$\alpha=0.05$ . The figure below demonstrates the methodology of this research.

**RESULT**



**Figure 1.** Research pathway diagram

**Table 1.** Subject characteristic

Characteristic	n	%	VAS Scale Before WELA (Mean ± SD)	P Value
Pregnancy Term				
• Preterm	12	2.7	7.42 ± 0.515	0,133
• Aterm	438	97.3	7.58 ± 0.493	
• Post-term	-	-		
Parity				
• Nullipara	20	4.4	7.60 ± 0.503	0,321
• Primipara	132	29.3	7.55 ± 0.499	
• Multipara (2 – 4 times)	298	66.3	7.62 ± 0.484	
Education Level				
• Elementary School	138	30.7	7.59 ± 0.493	0,609
• Junior High School	113	25.1	7.61 ± 0.490	
• Senior High School	107	23.8	7.58 ± 0.496	
• Bachelor	92	20.4	7.52 ± 0.502	
Job				
• Housewife	281	62.4	7.60 ± 0.491	0,612
• Employee	169	37.6	7.55 ± 0.499	
Total Subjects	450	100		

Table 1 shows subject characteristic which quite variable. On 450 labour with WELA 97,3% was aterm and 2,7% was preterm labour. From parity mostly are multipara which concise of 298 from 450 subjects (66,3%). Patient education ranging from elementary to bachelor

degree with nearly equal distribution. After tested data viability, we found all the characteristic factors have no impact on VAS score before WELA. After that we did normality test and continues with Wilcoxon due the data distribution was not normal ( $p < 0,005$ ).

**Table 2.** Distribution of VAS levels of patients before and after WELA

Pain Scale (VAS)	Mean	SD	P Value
Before WELA	7.58	0.494	0.0001 <sup>WX*</sup>
After WELA	3.37	0.484	

<sup>WX</sup>test was performed by Wilcoxon Test; \* $p < 0.005$

After we performed Wilcoxon test, in Table 2 we found there was significant difference ( $p < 0.05$ ) after administration of WELA compared than before. There

is better pain relief and increase maternal satisfaction with WELA, manifested by decrease in VAS significantly from 7.58 to 3.37.

**Table 3.** Fetal outcome after WELA

	APGAR	n	%
1 Minutes	7-10	441	98
	4-6	9	2
	<3	-	-
	Total	450	100
Menit 5 Minutes	7-10	450	100
	4-6	-	-
	<3	-	-
	Total	450	100

Table 3 shows APGAR outcome of fetus born by WELA. It was shown despite worries about anaesthesia during labour or intrapartum process fetal outcomes were good with 98% fetus with no asphyxia at 1 minute and all fetus has good outcomes at 5 minutes assessment.

**DISCUSSION**

The results of the study showed usage of neuraxial block which in this research is WELA resulted in a significant reduction in pain. This result consistent with recent studies by Piertzak *et al.* which compares all methods of labour pain management

and epidural anesthesia proved to be the most effective pain relief method.<sup>11</sup>

Understanding main physiological pathway of pain in labour is the key to unlocking the best pain management methods in labour. Labor pain can be divided into pathophysiologic, physiologic, nociceptive, and neuropathic mechanism.<sup>4</sup> Nociceptive pain which is common in labour classified as pain which came from cellular damage from trauma, it divided into somatic on the outside and visceral on the inside.<sup>4,9</sup> Nociceptive information transferred from dorsal horn to alert cells

with projections to higher centres. The spinothalamic tract (STT) cells in the superficial dorsal horn connect to lateral spinothalamic tract through midline, the impulses then ascend in the ventral white matter. STT cells bring information about both somatic and visceral pain to thalamic levels.<sup>4,12</sup>

During the first stage of labor, visceral pain usually predominates, with the transmission of nociceptive stimuli maximize from the uterus, cervix, adnexa, and pelvic ligaments.<sup>13</sup> These stimuli are transmitted via sympathetic fibers to the posterior nerve root ganglia at T10 through L1.<sup>13</sup> As fetal descent increases during late first stage and early second stage labor, distention surrounding the vaginal vault and pelvic structures intensifies and become the predominant source of noxious sensory input.<sup>9,13</sup> Finally, fetal delivery is dominated by stimuli arising from distention of the perineal structures. These stimuli are transmitted primarily by the pudendal nerves through the sacral plexus to the posterior nerve root ganglia at spinal levels S2 through S4.<sup>3,4,13</sup>

A study performed in UK in 2001, COMET (Comparative Obstetric Mobile Epidural Trial) studies, publish usage of low-dose epidural techniques is better compared with spinal anesthesia and traditional epidural.<sup>14</sup> We also found in our study there is no maternal side effect that occurs due to anesthesia.

Walking epidural analgesia offers a significant advantage over traditional epidural techniques during labor by providing pain relief while preserving mobility. This allows mothers to remain ambulatory, change positions, and even walk during labor, potentially leading to a more positive childbirth experience

and faster labor progress. Furthermore, the reduced impact on motor function associated with walking epidurals decreases the likelihood of assisted interventions, such as forceps or vacuum delivery, which can become necessary due to decreased pushing ability with traditional epidurals. Engaging in upright positions facilitated by walking epidurals can enhance the efficiency of contractions and potentially accelerate labor.<sup>15</sup>

A series of standard protocol are conducted for walking epidural analgesia includes a closed monitoring of hemodynamic and neurological clinical assessments to prevent orthostatic hypotension and bradycardia detection, evaluation of muscular weakness, and assessment of proprioception alterations to mitigate the risk of falls or cardiovascular repercussions on the fetus. If repeated bolus administration fails to provide adequate pain relief, the parturient will be immobilized in bed for further evaluation. Clinical tests are repeated if ambulation resumes because of the potential risk of motor block or orthostatic hypotension.<sup>16</sup>

Fetal outcome in intra-labour anesthesia keeps debated until now, no consistent findings has been identified neither of neonatal arterial pH nor APGAR difference in babies born from mothers with epidural.<sup>8</sup> Hill *et al.* examined effect of epidural analgesia with bupivacaine compared with IV meperidine on fetal heart rate (FHR) and found usage of epidural bupivacaine proves better. Reduction in FHR variabilities and acceleration associated with usage of IV meperidine compared to WELA bupivacaine.<sup>17</sup> Reynold *et al.* also report based on their systematic review instead of reduce fetal blood pH, epidural

analgesia was associated with improved neonatal acid-base status.<sup>18</sup> This is consistent with our finding all of 450 babies from epidural labour in our studies has no asphyxia.

### CONCLUSION

In conclusion, our findings demonstrate usage of WELA beneficial for both of mother and fetus. Increasing maternal confidence and reducing fear in normal labour was one of the benefits of WELA proven by significant decrease in VAS score during labour. Fetal outcome was also notably great after labour process and usage of epidural could decrease the risk of fetal acidemia and distress which reduce caesarean section rate. Usage of WELA in Indonesia could be encourage and recommend alternative to elective caesarean section.

Limitation of this study there is no comparison with normal pregnancy woman with the same coverage of samples, no records on maternal labour progress duration and APGAR score. Assessment of fetal pH could also be perform for more objective looks of fetal outcome. Further research with these data could prove extremely valuable and support this research founding.

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