ORIGINAL ARTICLE

Evaluating the Efficacy and Outcomes of Walking Epidural in Labor Analgesia

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Abstract:

Introduction: Labor pain is one of the deepest and most challenging sensations a person can endure, shaping both the physical and emotional perspective of childbirth, often requiring effective management to ensure a positive childbirth experience. The goal of labor analgesia is to provide sufficient pain relief while minimizing adverse effects on the mother and fetus. Methods: This prospective observational comparative study was conducted at Holy Family Red Crescent Medical College Hospital, Dhaka, and Popular Medical College Hospital, Dhaka, Bangladesh; the study spanned 2.5 years from December 2022 to July 2024. Result: The average pain score, measured on a scale from 0 to 10, indicates that patients in the walking epidural group experienced significantly less pain (2.5 ± 1.2) than those in the traditional epidural group (3.8 ± 1.5). Women who received the Walking Epidural (n=40) had a statistically significantly shorter average labor duration (8.5 hours ± 2.0) compared to those who received the Traditional Epidural (9.8 hours ± 2.5), with a p-value of 0.03. 90% of patients in the Walking Epidural group reported high satisfaction compared to 70% in the Traditional Epidural group (p = 0.02). The NICU admission rate was 5% (2 out of 40) in the Walking Epidural group and 10% (8 out of 40) in the Traditional Epidural group. The difference in the study was not statistically significant (p = 0.45). Conclusion: Our study demonstrates that walking epidurals provide superior pain relief, enhanced mobility, shorter labor durations, higher maternal satisfaction, and favorable delivery outcomes compared to traditional epidurals.

Key words: Walking epidural, Epidural analgesia, Traditional epidural, Labor pain, Pain relief.

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Introduction:

Labor pain is one of the deepest and most challenging sensations a person can endure, shaping both the physical and emotional perspective of childbirth, often requiring effective management to ensure a positive childbirth experience. The goal of labor analgesia is to provide sufficient pain relief while minimizing adverse effects on the mother and fetus.[1] Epidural analgesia is the most efficient method for pain relief during labor and is mainly performed in obstetric practice globally.[2] This method involves the administration of local anesthetics and/or opioids into the epidural space, resulting in sensory blockade and significant pain relief.[3]

Traditional epidural analgesia, while highly effective at providing pain relief, often results in significant motor blockade, limiting the mother's ability to move and ambulate during labor.[4] The lack of mobility can impact the labor process, potentially leading to longer labor durations and

increased rates of interventions such as cesarean sections and instrumental deliveries.[5] Furthermore, immobility may affect maternal satisfaction and comfort during labor, as many women prefer to be able to move and change positions to cope with contractions.[6]

The walking epidural, also known as the mobile epidural, was developed to address the limitations of traditional epidurals. Walking epidurals use a combination of lower doses of local anesthetics and opioids, aiming to provide adequate pain relief while preserving enough motor function to allow for mobility.[7] The ability to walk and adopt various positions during labor is believed to facilitate the descent of the fetus, potentially shortening labor duration and reducing the need for medical interventions.[8] Additionally, mobility can enhance maternal satisfaction and comfort, providing a more positive childbirth experience.[9]

Maintaining mobility during labor has several potential benefits. Studies have shown that upright positions and ambulation can help align the fetus with the birth canal, potentially resulting in more efficient labor progress.[10] Mobility can also aid in pain management by allowing the laboring woman to use gravity and movement to cope with contractions naturally.[11] Furthermore, being able to walk and move freely during labor can improve maternal psychological well-being and increase the sense of control and empowerment.[12]

Despite the potential benefits, the use of walking epidurals is not without challenges. There are concerns regarding the adequacy of pain relief provided by walking epidurals compared to traditional epidurals.[13] Some studies have reported that walking epidurals may not provide as complete pain relief as traditional epidurals, leading to higher pain scores in some cases.[14] Additionally, the safety of allowing mobility with an epidural in place must be carefully monitored to prevent falls and other complications.[15]

The efficacy of walking epidurals can be assessed through various outcomes, including pain relief effectiveness, labor duration, maternal satisfaction, delivery outcomes, and neonatal outcomes.[16] Pain relief effectiveness is typically measured using pain scores, while labor duration includes the first and second stages of labor.[17] Maternal satisfaction encompasses both subjective experiences and objective measures such as the rate of additional interventions.[18] Delivery outcomes focus on the mode of delivery, including rates of cesarean sections and instrumental deliveries, while neonatal outcomes include Apgar scores, and if needed, management can be done in the neonatal intensive care unit (NICU) admissions.[19,20] The primary objective was to compare the pain relief effectiveness of walking epidurals and traditional epidurals during labor.

Methodology:

This prospective comparative study was conducted at Holy Family Red Crescent Medical College Hospital, Dhaka, and Popular Medical College Hospital, Dhaka, Bangladesh, the study spanned 2.5 years from December 2022 to July 2024. A total of 80 participants were enrolled, with 40 women receiving walking epidurals and 40 receiving traditional epidurals. Inclusion criteria were singleton pregnancy, gestational age between 37 and 42 weeks, no contraindications to epidural analgesia, and active labor (defined as cervical dilation of 4 cm or more). Exclusion criteria included multiple pregnancies, pre-existing neurological disorders, contraindications to regional anesthesia (e.g., coagulopathy, infection at the injection site), non-vertex presentations, and severe fetal distress. Participants were randomly designated to receive either a walking epidural or a traditional epidural. The walking epidural group received a combination of a lower dose of local anesthetic (0.1% bupivacaine) and an opioid (fentanyl two mcg/mL), aiming to provide adequate pain relief while preserving enough motor function to allow for mobility. Participants in this group were encouraged to walk and change positions as desired, under supervision to ensure safety. The traditional epidural group was received a standard dose of local anesthetic (0.125% bupivacaine) with or without an opioid and were typically confined

to bed due to significant motor blockade. Data were collected on various parameters, including pain relief effectiveness, assessed using a visual analog scale (VAS) for pain at regular intervals during labor; mobility, recording the ability to walk or change positions during labor; labor duration, measured from the onset of active labor to delivery, including both the first and second stages of labor; maternal satisfaction, assessed using a standardized questionnaire postpartum; delivery outcomes, including mode of delivery (vaginal, cesarean section, instrumental), complications, and interventions required; and neonatal outcomes, such as the Apgar scores at 1 and 5 minutes and the need for neonatal intensive care unit (NICU) admission. Data were analyzed using appropriate statistical methods. Continuous variables were measured using t-tests or Mann-Whitney U tests, while absolute variables were analyzed using chi-square or Fisher's exact tests. A p-value of <0.05 was signified as statistically significant. The Ethical Review Boards approved the study of both hospitals. Written informed consent was obtained from all the subjects before enrollment. According to the Declaration of Helsinki and Good Clinical Practice guidelines, the study was confounded.

Results:

Table 1: Pain Relief Effectiveness of our Study Patients (N = 80)

Outcome	Walking Epidural (n=40)	Traditional Epidural (n=40)	p-value
Average Pain Score (0-10)	2.5 ± 1.2	3.8 ± 1.5	0.02
Effective Pain Relief (%)	34 (85%)	28 (70%)	0.04

Table 1 shows the effectiveness of pain relief for our study patients. The average pain score, measured on a scale from 0 to 10, indicates that patients in the walking epidural group experienced significantly less pain (2.5 ± 1.2) than those in the traditional epidural group (3.8 ± 1.5). The p-value of 0.02 suggests that this difference is statistically significant, implying that walking epidural provides better pain relief on average compared to traditional epidural. Effective pain relief was achieved in 85% of the patients in the walking epidural group (34 out of 40) compared to 70% in the traditional epidural group (28 out of 40 patients). The p-value of 0.04 indicates that this difference is statistically significant, suggesting that more patients experienced adequate pain relief with walking epidural than traditional epidural.

Table 2: Mobility during Labor

Outcome	Walking Epidural (n=40)	Traditional Epidural (n=40)	p-value
Mobile Patients (%)	30 (75%)	8 (20%)	<0.001
Average Duration of Mobility (hours)	3.5 ± 1.0	1.2 ± 0.8	<0.001

Table 2 shows mobility during labor. A notably higher proportion of the patients in the walking epidural group (75%, or 30 out of 40 patients) could remain mobile during labor compared to the traditional epidural group (20%, or 8 out of 40 patients). The p-value of <0.001 indicates that this difference is highly statistically significant. This suggests that the walking epidural allows for greater mobility during labor, which can benefit labor progression and maternal comfort. The average duration of mobility for patients in the walking epidural group was 3.5 ± 1.0 hours, significantly longer than the 1.2 ± 0.8 hours observed in the traditional epidural group. The p-value of <0.001 again indicates a highly statistically significant difference.

Table 3: Labor Duration

Outcome	Walking Epidural (n=40)	Traditional Epidural (n=40)	p-value
Average Labor Duration (hours)	8.5 ± 2.0	9.8 ± 2.5	0.03
First Stage Duration (hours)	6.0 ± 1.5	7.2 ± 1.8	0.04
Second Stage Duration (hours)	2.5 ± 0.8	2.6 ± 0.9	0.45

In Table 3, the data comparing labor durations between two groups of women who received different types of epidural anesthesia reveals notable differences. Women who received the Walking Epidural (n=40) had a statistically significantly shorter average labor duration (8.5 hours ± 2.0) compared to those who received the Traditional Epidural (9.8 hours ± 2.5), with a p-value of 0.03. Additionally, the first stage of labor was significantly shorter for women with the Walking Epidural (6.0 hours ± 1.5) compared to the Traditional Epidural group (7.2 hours ± 1.8), with a p-value of 0.04.No statistically significant difference was seen in the second stage duration between the Walking Epidural (2.5 hours ± 0.8) and Traditional Epidural (2.6 hours ± 0.9) groups, with a p-value of 0.45. These findings suggest that the type of epidural anesthesia administered may impact labor duration, particularly influencing the overall and first stage durations.

Table 4: Maternal Satisfaction

Outcome	Walking Epidural (n=40)	Traditional Epidural (n=40)	p-value
High Satisfaction (%)	36 (90%)	28 (70%)	0.02
Satisfaction Score (0-10)	8.5 ± 1.2	7.0 ± 1.5	0.01

Table 4 compares maternal satisfaction outcomes between Walking Epidural and Traditional Epidural groups. High Satisfaction (%): 90% of patients in the Walking Epidural group reported high satisfaction compared to 70% in the Traditional Epidural group ($p = 0.02$). This indicates a statistically significant difference in high satisfaction rates favoring the Walking Epidural. Satisfaction Score (0-10): The average satisfaction score was 8.5 ± 1.2 in the Walking Epidural group and 7.0 ± 1.5 in the Traditional Epidural group ($p = 0.01$). This also shows a statistically significant difference in satisfaction scores, with higher scores observed in the Walking Epidural group. Overall, the percentage of patients reporting high satisfaction and the average satisfaction scores were significantly higher in the Walking Epidural group than in the Traditional Epidural group.

Table 5: Delivery Outcomes

Outcome	Walking Epidural (n=40)	Traditional Epidural (n=40)	p-value
Cesarean Section Rate (%)	6 (15%)	10 (25%)	0.25
Instrumental Delivery Rate (%)	4 (10%)	8 (20%)	0.22
Spontaneous Vaginal Delivery Rate (%)	30 (75%)	22 (55%)	0.05

Table 5 presents the delivery outcomes comparing Walking Epidural and Traditional Epidural groups. Cesarean section rate was 15% in the Walking Epidural group and 25% in the Traditional Epidural group ($p = 0.25$). This difference was not statistically significant. The instrumental delivery rate was 10% in the Walking Epidural group and 20% in the Traditional Epidural group ($p = 0.22$). Similar to the Cesarean section rate, this difference was not statistically significant. The spontaneous vaginal delivery rate was 75% in the Walking Epidural group and 55% in the Traditional Epidural group ($p = 0.05$). This difference approached statistical significance,

indicating a trend toward higher rates of spontaneous vaginal delivery in the Walking Epidural group.

Table 6: Neonatal Outcomes

Outcome	Walking Epidural (n=40)	Traditional Epidural (n=40)	p-value
Average Apgar Score at 1 min	8.5 ± 0.5	8.2 ± 0.6	0.08
Average Apgar Score at 5 min	9.0 ± 0.3	8.8 ± 0.4	0.06
NICU Admission Rate (%)	2 (5%)	8 (10%)	0.45

Table 6 presents the neonatal outcomes comparing Walking Epidural and Traditional Epidural groups. Average Apgar Scores at 1 min: The Walking Epidural group had a mean score of 8.5 ± 0.5, while the Traditional Epidural group had a mean score of 8.2 ± 0.6. The difference in the study was not statistically significant ($p = 0.08$).Average Apgar Scores at 5 min: The Walking Epidural group had a mean score of 9.0 ± 0.3, and the Traditional Epidural group had a mean score of 8.8 ± 0.4. This difference in the study was not statistically significant ($p = 0.06$). The NICU admission rate was 5% (2 out of 40) in the Walking Epidural group and 10% (8 out of 40) in the Traditional Epidural group. This difference in the study was not statistically significant ($p = 0.45$). Comprehensively, there were no statistically significant differences in neonatal outcomes between the Walking Epidural and Traditional Epidural groups based on the p-values obtained.

Discussion

This study evaluates the efficacy and outcomes of walking epidurals in labor analgesia compared to traditional epidurals. The study indicates significant differences between the two methods in pain relief, mobility during labor, labor duration, maternal satisfaction, delivery outcomes, and neonatal outcomes. These results align with and expand upon previous research in the field.

Our study found that the walking epidural group experienced significantly lower average pain scores (2.5 ± 1.2) than the traditional epidural group (3.8 ± 1.5), with a p-value of 0.02. This aligns with findings by Comparative Studies, which reported similar results in pain management effectiveness. Effective pain relief was achieved in 85% of the patients in the walking epidural group compared to 70% in the traditional epidural group ($p = 0.04$). This suggests that walking epidurals may provide better pain relief for a higher percentage of patients. A study by Collis et al. reported adequate pain relief in 80% of walking epidural cases compared to 65% in traditional epidural cases, corroborating our findings.[21]

Maintaining mobility during labor is a significant advantage of walking epidurals. Our study demonstrated that 75% of patients in the walking epidural group remained mobile during labor, compared to only 20% in the traditional epidural group ($p < 0.001$). This study difference is statistically significant and highlights the benefit of walking epidurals in preserving patient mobility. Similar results were observed in a study by Pan et al., where 70% of walking epidural patients remained mobile, compared to 18% in the traditional epidural group.[22] Walker et al. also found that more women with walking epidurals could maintain mobility than those with conventional epidurals, with 65% versus 15%, respectively.[23] This further supports the finding that walking epidurals significantly enhance the ability to move during labor. Mobility during labor has been associated with shorter labor duration and improved maternal comfort and satisfaction, reinforcing the clinical benefits observed in our study. Howell et al. conducted a randomized controlled trial that demonstrated that women who received walking epidurals experienced higher levels of mobility compared to those who received traditional epidurals, and this was associated with greater maternal satisfaction and a reduction in the duration of the first stage of labor.[24]

Our findings indicate that the average labor duration was significantly shorter in the walking epidural group (8.5 ± 2.0 hours) compared to the traditional epidural group (9.8 ± 2.5 hours, p = 0.03). The first stage of labor was also significantly shorter for the walking epidural group (6.0 ± 1.5 hours vs. 7.2 ± 1.8 hours, p = 0.04), while the second stage duration showed no significant difference between the two groups. A study by Howell et al. reported similar results, with the walking epidural group experiencing a shorter overall labor duration of approximately 1.5 hours than the traditional epidural group.[24] Shorter labor durations are beneficial in reducing maternal fatigue and the need for additional interventions.

Maternal satisfaction is a critical measure of the success of labor analgesia. Our study found that 90% of patients in the walking epidural group reported high satisfaction, compared to 70% in the traditional epidural group (p = 0.02). The satisfaction score we compared was also significantly higher in the walking epidural group (8.5 ± 1.2 vs. 7.0 ± 1.5, p = 0.01). This finding is supported by the work of Riley et al., who reported higher satisfaction rates among women who received walking epidurals.25 Increased maternal satisfaction is likely due to significant pain relief and the ability to endure mobile, contributing to a more favorable labor experience.

Our study showed that the rate of spontaneous vaginal delivery was higher in the walking epidural group (75%) compared to the traditional epidural group (55%, p = 0.05). Although the rates of cesarean sections and instrumental deliveries were lower in the walking epidural group, these differences were not statistically significant. This trend towards higher spontaneous vaginal delivery rates is equivalent to the findings from previous studies, such as those by Liu et al., who observed a 72% spontaneous vaginal delivery rate in walking epidural patients compared to 50% in traditional epidural patients.[26] The ability to remain mobile may facilitate the progress of labor and reduce the need for surgical interventions.

Neonatal outcomes are a critical measure of the efficacy and safety of labor analgesia methods. Our study found no statistically significant differences in neonatal outcomes between the walking and traditional epidural groups. The average Apgar scores at 1 minute were 8.5 ± 0.5 for the walking epidural group and 8.2 ± 0.6 for the traditional epidural group (p = 0.08). At 5 minutes, the scores were 9.0 ± 0.3 and 8.8 ± 0.4, respectively (p = 0.06). NICU admission rates were also 5% for the walking epidural group and 10% for the traditional epidural group (p = 0.45). These findings are consistent with the results of several other studies. Pan et al. reported no significant differences in Apgar scores and NICU admissions between the two groups, indicating that walking epidurals do not negatively impact neonatal health.[22] Similarly, Lieberman et al. found that neonatal outcomes, including Apgar scores and NICU admissions, were comparable between walking and traditional epidural groups.[27] Walker et al. observed no adverse effects on neonatal outcomes using walking epidurals. Their study showed that Apgar scores at 1 and 5 minutes were similar across both groups, aligning with our findings.[23] Howell et al. further supported this by demonstrating no significant differences in neonatal health markers between the two analgesia methods.[24]

The findings of our study have important clinical implications for managing labor pain. Walking epidurals offer several advantages over traditional epidurals, including better pain relief, increased mobility during labor, shorter labor durations, higher maternal satisfaction, and a trend toward higher rates of spontaneous vaginal delivery. These benefits suggest that walking epidurals could be a preferred option for many women, particularly those who value mobility and a more active labor experience.

Limitations of the study

Despite the positive findings, our study has several limitations. While the sample size of 80 participants is adequate for detecting significant differences, it may limit the generalizability of the results. Larger

samples are needed to signify these findings across diverse populations. Additionally, our study was conducted at two hospitals in Dhaka, which may introduce location-specific biases. Future studies should include multiple centers across different regions to enhance the validation of the results.

Conclusion

In conclusion, our study demonstrates that walking epidurals provide superior pain relief, enhanced mobility, shorter labor durations, higher maternal satisfaction, and favorable delivery outcomes compared to traditional epidurals. These findings support the use of walking epidurals as a viable and potentially preferred option for labor analgesia. Future research should based on broader, multi-center studies to identify these findings and further explore the benefits and limitations of walking epidurals. By continuing to investigate and compare different labor analgesia methods, we can improve women's quality of care and outcomes during labor and delivery.

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