

Original Article

Effects of Ambulation during the First Stage of Labor on Maternal and Neonatal Outcomes: A Randomized Controlled Trial

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ABSTRACT

Background: In Jordan, practices in maternity wards are not based on the best evidence. Women are still largely confined to bed during the first stage of labor. **Objective:** This study examined the effect of ambulation during the first stage of labor on maternal and neonatal outcomes. **Methods:** A blinded randomized controlled trial was conducted in a labor ward of one large hospital in Southern Jordan. Primiparous women ($n = 290$) were randomly assigned to an intervention group ($n = 140$) and a control group ($n = 150$). The intervention group was encouraged to ambulate, and the control group received the usual care. Descriptive statistics, independent t -tests, and analysis of variance were used for data analysis. **Results:** Compared to the control group, women in the intervention group experienced a shorter duration of the first stage of labor ($P < 0.001$), reported less intensity of labor pain ($P < 0.001$), and used less analgesics ($P < 0.001$). They experienced less augmentation of labor ($P = 0.030$), were more likely to give birth by normal vaginal birth ($P = 0.015$) and were more satisfied with the birth experience ($P = 0.001$). No statistically significant differences were found between groups concerning perineal status, postpartum complications, and neonatal outcomes. **Conclusion:** Although the intervention has had a positive impact on maternal outcomes, no negative effects on neonatal outcomes were found. Encouraging women to ambulate and assume the upright position during the first stage of labor, is likely to produce better physical, social and economic outcomes in maternity services.

KEYWORDS: Ambulation, Childbirth outcomes, Labor, Randomized trial

INTRODUCTION

Increasing evidence has shown that walking and upright positions in the first stage of labor reduce the duration of labor, the risk of cesarean birth, and the need for epidural analgesia, and have no adverse effects on the mother and the baby.^[1] Earlier studies revealed that confining laboring women to bed increases pain and decreases women's satisfaction with their birth experience.^[2,3] Women, particularly those with low-risk labor, are now strongly advised to adopt upright positions during labor.^[4,5]

Studies revealed that movement is effective in reducing the duration of labor and the intensity of labor pain.^[6,7] Prabhakar *et al.* found that ambulation during the first stage of labor was effective in reducing the duration of

labor and had no adverse neonatal outcomes.^[7] Bala *et al.* have also reported the positive effects of back massage and ambulation during the first stage of labor in reducing labor pain and anxiety among primigravid mothers.^[8] A study also found a shorter duration of the first stage of labor and fewer cesarean births in the ambulation group compared to the control group.^[9] Meanwhile, a single and old study, the results of which showed no difference between ambulated and nonambulated groups for the

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mode of deliveries, labor duration, maternal neonatal well-being, and other outcomes.^[10] Despite evidence in the literature that ambulation and upright positioning during labor does not harm the mother and fetus, many women are still largely confined to bed during the first stage of labor.^[1,11] The increased use of medical interventions such as epidural analgesia, continuous electronic fetal monitoring, and intravenous infusions, creates a restrictive birthing environment and limits women's movement and prevents them to cope with the pain and anxiety of labor.^[12-14]

In developing countries, including Jordan, practices in maternity wards are not based on the best evidence.^[12,14] The majority of health facilities restrict movement during labor, women are confined to bed in the lithotomy position, and most of these facilities strap laboring women into the delivery position.^[12,14] Therefore, the question remains whether ambulation in the first stage of labor affects maternal and neonatal outcomes.

Objective

This study aimed to examine the effects of ambulation during the first stage of labor on the length of the first stage of labor, the intensity of labor pain, the use of analgesics, the rate of vaginal delivery, and satisfaction with the birth experience.

METHODS

Study design and participants

A double-blinded randomized controlled trial was conducted at the labor ward of a large hospital in Southern Jordan. Participants were eligible for the trial if they were: primiparous, with uncomplicated singleton pregnancies, between 37 and 41 weeks gestation, cephalic presentation, and cervical dilatation 3–5 cm (labor contractions are stronger and more frequent). Women with a pre-existing medical condition or any other condition arising during pregnancy that required nonroutine interventions were excluded from the study.

Study outcomes and measurements

The study outcomes were related to maternal outcomes and neonatal outcomes. The maternal outcomes included: (1) Duration of the first stage of labor (defined as the time from the onset of regular contractions, recorded by the responsible midwife and determined when contractions last about 30–70 s and come about 5–10 min apart) to the time of full cervical dilatation of 10 cm as documented by the midwife in the case notes); (2) Intensity of labor pain (measured by the Visual Analogue Pain Scale developed by Capogna *et al.*^[15] rating from 0 to 10 in which the woman registers the pain perception, considering 0 no pain and 10 the worst

pain imaginable, psychometric results showed acceptable reliability of 0.79); (3) Use of analgesics (defined as used or not used), (4) Mode of birth (defined as normal, vacuum extraction, forceps delivery, or cesarean section), (5) labor augmentation (defined as augmented or not augmented), (6) Perineal status (defined as intact perineum or not intact [tear or episiotomy]), (7) Postpartum status (defined as the presence of complications such as maternal hypotension, postpartum hemorrhage, newborn trauma, and newborn death), and (8) Women's satisfaction with the birth experience (measured by a 10-item satisfaction/dissatisfaction scale developed based on the work of Hollins-Martin and Martin 2014.^[16,17] Women responded on a five-point Likert scale (4 = strongly satisfied, 3 = satisfied, 2 = neither satisfied nor dissatisfied; 1 = dissatisfied; 0 = strongly dissatisfied). The total score could range from 0 to 40, higher scores indicate more satisfaction. In this study, the Cronbach's alpha of the scale was 0.81.

Specific neonatal outcomes such as Apgar scores at 1 min and 5 min need for positive pressure ventilation, admission to a neonatal intensive care unit (NICU), birth trauma, and perinatal death were taken from routine data in the women's file.

Sample size and randomization

The sample size was calculated using the G power version 3.1. Based on the difference between the two independent groups, $\alpha = 0.05$, median effect size 0.3, and power = 95%, the sample size required for each group was 88 women. To overcome attrition, 25% ($n = 22$) more women were added to the calculated sample, and the sample size required was at least 110 women in each group. After participants gave their written consent, they were randomized into the intervention and control groups by an assistant researcher using a table of random numbers. Of 290 women who agreed to participate, 140 were assigned to the intervention group and 150 to the control group.

Intervention

In the intervention group, women were encouraged to ambulate during labor, and women in the control group received usual maternity care. "Ambulation during labor" here referred to encouraging the woman to move from place to place. The assistant researcher (midwife) informed the woman about the study and encouraged her to walk. The woman was instructed to start walking outside her room and circulate the midwives' station (located in the center of the labor department) and back to her room more than once to reduce the amount of time a woman spends laying down during this stage (measured by recording the number of minutes

spent on walking). There was no additional care other than the instruction to walk regularly.

Data collection

Data were collected using the structured tool developed by the researchers based on the literature review of research related to the current topic. The tool is composed of a section collecting the sociodemographic data and another section collecting maternal and neonatal outcomes. The research tool was reviewed by three experts in maternity care. Before starting the study, the final version of the tool was tested in a pilot study with five women during their labors to evaluate its feasibility, clarity, and reliability. The assistant researcher (midwife) completed the first section of the tool, which was related to sociodemographic data, and allocated participants to intervention or control groups according to the randomization list. The principal researcher was kept blind for those participants who were in the intervention and control groups. The primary investigators completed the second part of the study tool for both intervention and control groups, which was related to maternal and infant health outcomes, 24–48 h after birth.

Ethical considerations

Approval to conduct the study was obtained from the ethics committee at the Faculty of Nursing, Mutah University and the Ministry of Health (ethics code: EC2/2017) and was registered on Clinical Trials.gov (RCT code: NCT03447015: <https://clinicaltrials.gov/ct2/show/NCT03447015>). Women were informed about the study, and verbal and written consent was obtained from each woman. Women were assured that participation was voluntary, and they had the right to withdraw from the study at any time without giving any reason. Women were assured that their specific information will not be recognized in any products of this research.

Data analysis

Data were analyzed using the SPSS software (v. 22.0, SPSS Inc., Chicago, IL, USA). Descriptive statistics were used to describe the nature of the sample. According to the level of measurement, independent *t*-test, Chi-square test, and analysis of variance were used to examine the differences between study groups based on baseline sociodemographic data and health outcomes. Statistical assumptions were checked and ensured, and results were considered statistically significant if $P < 0.05$.

RESULTS

During the study, 2453 births occurred at the selected hospital. Of the 570 primiparous, 450 were eligible and invited to participate in the study. Of the 290

women who agreed to participate, 95 in the intervention group and 106 in the control group completed the study [Figure 1]. The women who refused to take part did so because they were not interested in participating in the study. Despite random allocation, women in the intervention group were older, more likely to have a university education, have a monthly income of more than 400 JD, and live in a city [Table 1].

Significant differences were found between the study groups for the majority of the maternal outcomes. Compared to the control group, women in the intervention group experienced a shorter duration of the first stage of labor ($t = -171.25$, $P < 0.001$), reported less intensity of labor pain ($\chi^2 = 19.178$, $P < 0.001$), used less analgesics ($\chi^2 = 20.640$, $P < 0.001$), experienced less augmentation of labor ($\chi^2 = 4.887$, $P = 0.030$), were more likely to give birth by normal vaginal birth ($\chi^2 = 8.444$, $P = 0.015$) and were more satisfied with the birth experience ($\chi^2 = 135.615$, $P < 0.001$). No significant differences were found between groups regarding the perineal status and postpartum complication status. All women in both groups had an episiotomy. Few women in the control group ($n = 4$) experienced postpartum hemorrhage [Table 2].

No significant differences were found between groups regarding neonatal outcomes. Ambulation during labor had no negative effects on neonatal status or health. Few cases needed positive pressure ventilation (control group = 3) or were admitted to NICU (intervention group = 4, control group = 10). No birth trauma or perinatal deaths were reported in both groups [Table 3].

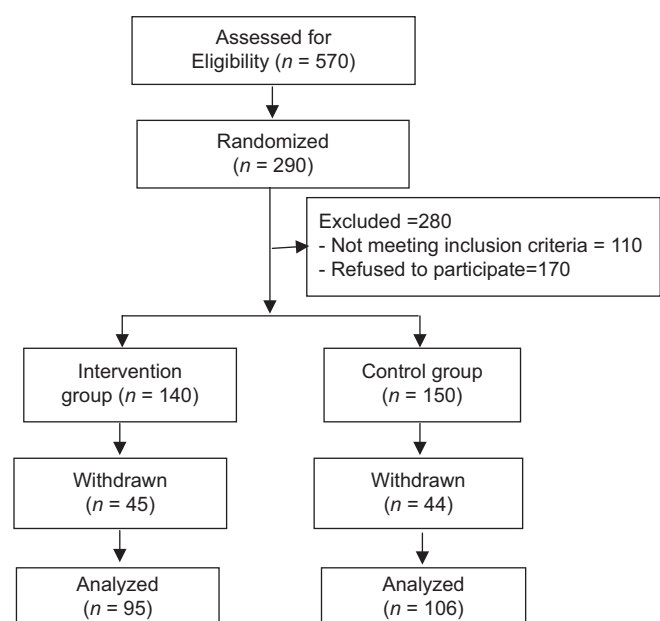


Figure 1: The study flow chart

Table 1: Sociodemographic characteristics of the participants

Variables	Group ^a		P ^a
	Intervention (n = 95)	Control (n = 106)	
Age			
<20 years	10 (10.5)	19 (17.9)	0.020
20-29	66 (69.5)	79 (74.5)	
30-39	19 (20.0)	8 (7.5)	
Education			
Illiterate	1 (1.1)	21 (19.8)	<0.001
Primary school	11 (11.6)	19 (17.9)	
Secondary school	23 (24.2)	22 (20.8)	
Diploma	16 (16.8)	22 (20.8)	
Bachelor	44 (46.3)	22 (20.8)	
Employment			
Employed	25 (26.3)	17 (16.0)	0.053
Not employed	70 (73.7)	89 (84.0)	
Nationality			
Jordanian	85 (89.5)	106 (100)	<0.001
Non-Jordanian	10 (10.5)	0	
Income (Jordanian dinar)			
<200	16 (16.8)	21 (19.8)	0.050
200-399	11 (11.6)	25 (23.6)	
400-599	57 (60.0)	55 (51.9)	
≥600	11 (11.6)	5 (4.7)	
Residence			
City	50 (52.6)	38 (35.8)	0.017
Village	45 (47.4)	68 (64.2)	
Health insurance			
Yes	54 (56.84)	55 (51.89)	0.433
No	41 (43.16)	51 (48.11)	

^aχ². Data are presented as n (%)

DISCUSSION

To date, restriction on movement during labor and birth is a consistent practice in Jordan. This general practice differs from the World Health Organization guidelines for normal birth, which recommends ambulation and upright positions during labor as an efficient intervention to achieve favorable maternal and neonatal outcomes.^[4] Findings from this study support the current evidence and findings of previous studies that ambulation in the first stage of labor in primiparous women increases the chance for normal vaginal births with shorter duration of the first stage of labor, less labor pain intensity, less use of analgesics and more satisfaction with the birth experience. No negative effects were apparent in maternal or neonatal outcomes. In the study reported here and consistent with previous studies, women in the intervention group experienced a shorter duration of the first stage of labor,^[6,9] reported less intensity of labor pain,^[8,18] used less analgesia, experienced less augmentation of labor, were more likely to give birth by normal vaginal birth and were more satisfied with the

Table 2: Maternal outcomes of participants

Variables	Group		P ^a
	Intervention (n = 95)	Control (n = 106)	
Analgesics use			
Yes	44 (46.3)	82 (77.4)	<0.001
No	51 (53.7)	24 (22.6)	
Mode of birth			
Normal	95 (100)	97 (91.5)	0.015
Vacuum cesarean	0	9 (4.7)	
Augmentation			
Yes	51 (53.7)	73 (68.9)	0.030
No	44 (46.3)	33 (31.1)	
Type of augmentation			
Foleys	10 (19.6)	4 (5.4)	0.006
Prostine	13 (25.5)	13 (17.6)	
Cyntocinon	26 (51.0)	57 (77.0)	
Artificial rupture of membranes	2 (3.9)	0	
Postpartum hemorrhage			
Yes	0	4 (3.8)	0.056
No	95 (100)	102 (96.2)	
Labor pain			
Moderate	26 (27.4)	9 (8.5)	<0.001
Severe	57 (60.0)	62 (58.5)	
Very severe	12 (12.6)	35 (33.0)	
Maternal satisfaction			
Satisfied	89 (93.68)	9 (8.49)	<0.001
Dissatisfied	6 (6.31)	97 (91.50)	

^aχ². Data are presented as n (%)

birth experience^[18] compared with the control group. These similarities in findings could be attributed to the use of similar working methods. On the other hand, the findings of the current study contradict the findings of the previous study that reported no difference between ambulated and nonambulated groups for the mode of deliveries, labor duration, maternal neonatal well-being, and other outcomes.^[10] However, the authors of this opposite study concluded that these findings should not discourage physicians from encouraging women to walk during the first stage of labor. Rather, the findings suggest that walking during labor is not medically superior or inferior to labor in bed.

No significant differences were found between groups regarding the perineal status and postpartum complication status.^[19] Results showed that all women in both groups had episiotomies. This result was expected as performing episiotomy is a routine procedure for all primiparous women in public hospitals in Jordan.^[20] Similar to previous studies, our results showed no significant differences between groups regarding neonatal outcomes. Ambulation during labor had no negative effect on neonatal health.^[6,9,18,19] Furthermore, this study confirms that ambulation is a cost-effective

Table 3: Neonatal outcomes of participants

Variable	Group		Total	P ^a
	Intervention	Control		
Apgar score at 5 min				
4-6	14 (14.7)	33 (31.13)	47 (23.38)	0.005
≥7	81 (85.26)	73 (68.86)	154 (76.61)	
Need ventilation				
Yes	0	3 (2.8)	3 (1.5)	0.099
No	95 (100)	103 (97.2)	198 (98.5)	
Admission to NICU				
Yes	4 (4.2)	10 (9.4)	14 (7.0)	0.146
No	91 (95.8)	96 (90.6)	187 (93.0)	
Reason for admission to NICU				
Grunting	0	5 (50.0)	5 (35.7)	0.078
Observation	4 (100)	5 (50.0)	9 (64.3)	

^aχ². Data are presented as *n* (%). NICU: Neonatal intensive care unit

intervention that the midwife or nurse can implement independently.^[7]

This study utilized a blinded randomized controlled trial design and adopted multiple outcome variables to measure maternal and fetal outcomes. This study was the first that has introduced and tested the evidence-based practice of encouraging women to ambulate and assume the upright position during the first stage of labor and observed the effectiveness of such an intervention in Jordan. However, there are some limitations to this study. As a single hospital trial, the results may not be generalizable to other health-care settings. Moreover, despite randomization, participant characteristics differed between intervention and control groups. Future larger studies with matched samples could be used to overcome this limitation. As we included only nulliparous women, our results may not be generalized to the entire laboring women population. Other factors, including previous childbirth experience, may influence the results. It would be interesting in the future to investigate differences between primiparous and multiparous women.

CONCLUSION

Results of this randomized controlled trial indicate that this low-cost intervention had a positive impact on maternal outcomes with no negative impact on neonatal outcomes. These results suggest improved results modification of the maternity health service environment, especially the labor ward. Therefore introducing the evidence-based practice of encouraging women to ambulate and assume the upright position during the first stage of labor to produce better outcomes would provide optimal clinical and economic results.

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Conflicts of interest

There are no conflicts of interest.

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