

ORIGINAL RESEARCH ARTICLE

Conventional supine delivery position versus free-position delivery guidance intervention on delivery outcomes, pain, and maternal–neonatal outcomes in primiparous women

DOI: 10.29063/ajrh2026/v30i15.3

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Abstract

This randomized comparative study investigated the effects of free-position delivery guidance combined with prenatal intervention on pain levels, delivery outcomes, and maternal–neonatal outcomes in primiparous women. A total of 80 primiparous women admitted to the hospital between April 2023 and October 2025 were included in the study. Participants were randomly divided into two groups of 40 each using a random number table. The control group received conventional supine delivery with basic guidance, while the study group received free position delivery guidance combined with prenatal intervention. Labor duration, pain scores, delivery outcomes, and the incidence of adverse maternal–neonatal outcomes were compared between the two groups. The study group showed significantly shorter labor duration and total labor time compared to the control group ($P < 0.05$). The study group also demonstrated significantly lower pain scores ($P < 0.05$). The study group exhibited a significantly higher rate of natural delivery and a significantly lower rate of cesarean section compared to the control group ($P < 0.05$). The incidence of adverse maternal–infant outcomes in the study group was significantly lower than that in the control group ($P < 0.05$). The combination of free-position delivery guidance and prenatal intervention can effectively improve delivery outcomes, alleviate labor pain, and reduce adverse maternal–neonatal outcomes in primiparous women. (*Afr J Reprod Health* 2026; 30 [15]: 26-31).

Keywords: Free-position delivery guidance; prenatal intervention; primipara; delivery outcomes; pain; maternal–infant outcomes

Résumé

Cette étude comparative randomisée a examiné les effets d'un accompagnement à l'accouchement en position libre, associé à une intervention prénatale, sur l'intensité de la douleur, les issues de l'accouchement et les résultats materno-néonataux chez des femmes primipares. Au total, 80 femmes primipares admises à l'hôpital entre avril 2023 et octobre 2025 ont été incluses dans l'étude. Les participantes ont été réparties de manière aléatoire en deux groupes de 40 personnes chacun, à l'aide d'une table de nombres aléatoires. Le groupe témoin a bénéficié d'un accouchement conventionnel en décubitus dorsal avec un accompagnement standard, tandis que le groupe expérimental a bénéficié d'un accompagnement à l'accouchement en position libre associé à une intervention prénatale. La durée du travail, les scores de douleur, les issues de l'accouchement et l'incidence des complications materno-néonatales ont été comparés entre les deux groupes. Le groupe expérimental a présenté une durée du travail et une durée totale du travail significativement plus courtes que le groupe témoin ($P < 0,05$). Ce groupe a également affiché des scores de douleur significativement plus faibles ($P < 0,05$). Le groupe expérimental a enregistré un taux d'accouchement par voie basse significativement plus élevé et un taux de césarienne significativement plus faible par rapport au groupe témoin ($P < 0,05$). L'incidence des complications materno-néonatales dans le groupe expérimental était significativement inférieure à celle observée dans le groupe témoin ($P < 0,05$). L'association d'un accompagnement à l'accouchement en position libre et d'une intervention prénatale permet d'améliorer efficacement les issues de l'accouchement, d'atténuer la douleur liée au travail et de réduire les complications materno-néonatales chez les femmes primipares. (*Afr J Reprod Health* 2026; 30 [15]: 26-31).

Mots-clés : Conseils sur le choix de la position lors de l'accouchement ; intervention prénatale ; primipare ; issues de l'accouchement ; douleur ; devenir materno-fœtal

Introduction

For primiparas, prolonged labor duration, lack of experience, and the associated pain of childbirth

can lead to strong negative emotions and resistance toward natural delivery. This significantly undermines their confidence in childbirth, further reducing their compliance and resulting in adverse

pregnancy outcomes.¹ Therefore, establishing effective methods to alleviate labor pain and enhance maternal comfort in primiparas not only helps mitigate negative emotions but also significantly improves delivery outcomes.² The application of free positioning during delivery allows mothers to assume comfortable positions throughout labor, thereby enhancing comfort.³ Additionally, appropriate prenatal interventions may improve maternal metabolic status and reduce the risk of delivery complications.⁴

However, previous studies have primarily evaluated free-position delivery or prenatal interventions independently, and there is limited evidence assessing the combined effect of these two strategies in primiparous women. In addition, there is a lack of comprehensive data examining their simultaneous impact on labor pain, delivery outcomes, and maternal–neonatal outcomes. Therefore, exploring an integrated intervention approach may provide more effective and clinically relevant improvements in obstetric care.

Therefore, this study aimed to evaluate the effects of free-position delivery guidance combined with prenatal intervention on labor duration, pain perception, delivery outcomes, and maternal–neonatal outcomes in primiparous women.

Methods

General information

This study conducted an intervention analysis of 80 primiparous women admitted to the hospital from April 2023 to October 2025. The participants were randomly divided into two groups of 40 cases each using a random number table. The age distribution of the control group ranged from 24 to 33 years, while that of the study group ranged from 25 to 35 years, with corresponding mean values of (27.25 ± 1.26) years and (27.29 ± 1.29) years, respectively. The gestational age distribution of the control group ranged from 37 to 41 weeks, while that of the study group ranged from 38 to 41 weeks, with corresponding mean values of (39.25 ± 0.13) weeks and (39.29 ± 0.11) weeks, respectively. The body mass index (BMI) distribution of the control group ranged from 21.03 kg/m² to 26.03 kg/m², while that of the study group ranged from 21.05 kg/m² to 26.47

kg/m², with corresponding mean values of (23.79 ± 0.55) kg/m² and (23.81 ± 0.56) kg/m², respectively. No significant differences were observed between the two groups in the aforementioned parameters ($P > 0.05$).

Inclusion and exclusion criteria

Inclusion criteria: 1. All primiparas were classified as cephalic presentation, live birth, and singleton pregnancy; 2. All pregnant women underwent prenatal examinations without showing any abnormalities; 3. Participants were willing to participate in the study and demonstrated good compliance. Exclusion criteria: 1. Presence of amniotic cavity infection; 2. Manifestation of placenta previa or threatened abortion; 3. Presence of uterine or adnexal complications; 4. Presentation of preeclampsia or gestational hypertension syndrome.

Control group method

Routine supine position delivery was performed with basic guidance interventions.

1. During the prenatal preparation phase, appropriate basic guidance interventions were provided, including proactive recommendations for dietary adjustments during pregnancy, such as moderate supplementation of iron and folic acid. No personalized interventions were administered to the patient, except for advising avoidance of high-fat and high-sugar diets. Standard pre-delivery preparations were conducted, with assistance in maintaining the supine position after admission and preparing for fetal heart monitoring. Intravenous fluid administration was routinely provided to maintain fluid balance.

2. During the delivery process, standard interventions were implemented: in the first stage, the mother was assisted in maintaining a supine position throughout labor with corresponding activity management. During pain management, epidural anesthesia and other pharmacological interventions were primarily used. In the second stage, the mother was still assisted in maintaining a supine position on the delivery table with legs positioned properly. For breath-holding straining, midwives provided guidance, and perineal

episiotomy was performed when necessary. In the third stage, the mother was assisted in delivering the placenta in a supine position, with careful monitoring of uterine contractions according to routine protocols. Postpartum, no special dietary interventions were provided, only standard general nutrition.

Study group methods

The study group received free-position delivery guidance combined with prenatal intervention to complete corresponding interventions.

1. Individualized prenatal interventions were provided, including dietary planning at 28 weeks of gestation to ensure a daily protein intake exceeding 80 g, supplementation with 400 µg folic acid and 30 mg iron, and appropriate use of probiotics and DHA. Prenatal education was also provided to train mothers in free-position delivery techniques, non-pharmacological pain relief methods, and breathing techniques.

2. Structured delivery support interventions were implemented. During the first stage of labor, mothers were encouraged to remain active through slow walking, use of delivery balls, and lateral positioning. Dynamically adjust the mother's position based on comfort, controlling the frequency of changes to once every 30–60 minutes. During the second stage of labor, allow the mother to autonomously choose delivery positions such as squatting or hand-knee positions, with midwives assisting in corresponding adjustments. Under gravity, promote fetal head descent, avoiding routine episiotomy during this period. During the third stage of labor, ensure the smooth delivery of the placenta under free-lying conditions, and perform immediate skin-to-skin contact between mother and baby;

3. Postpartum support interventions included continued nutritional guidance with iron supplementation and high-protein diets for up to 6 weeks postpartum, along with guidance on appropriate breastfeeding positions.

Outcome variables The outcome variables were clearly defined and measured as follows:

The duration of labor included the first stage, second stage, third stage, and total labor time, all of which were recorded in minutes using standardized labor

monitoring charts by trained obstetric staff. Maternal pain was assessed using the Visual Analogue Scale (VAS), which ranges from 0 to 10, where 0 indicates no pain and 10 indicates the worst possible pain. Pain scores were recorded during the active phase of the first stage of labor by trained nursing personnel. Delivery outcomes included the mode of delivery, which was categorized as natural vaginal delivery or cesarean section based on clinical records.

Maternal outcomes included postpartum hemorrhage and uterine atony. Postpartum hemorrhage was defined as blood loss of 500 mL or more after vaginal delivery. Uterine atony was diagnosed based on clinical assessment of inadequate uterine contraction after delivery. Neonatal outcomes included neonatal asphyxia and fetal distress. Neonatal asphyxia was defined as an Apgar score of less than 7 at 1 minute after birth. Fetal distress was diagnosed based on abnormal fetal heart rate monitoring during labor. All outcome variables were assessed and recorded by trained obstetric staff using standardized clinical procedures.

Statistical methods

Statistical analysis was performed using SPSS version 27.0. Continuous variables were expressed as mean ± standard deviation ($\bar{x} \pm s$) and analyzed using the independent-sample t-test. Categorical variables were expressed as n (%) and analyzed using the chi-square test. A P value <0.05 was considered statistically significant.

Ethical consideration

This study was approved by the Ethics Committee of Longyou County People's Hospital, Zhejiang, China. Written informed consent was obtained from all participants prior to enrollment in the study.

Results

Comparison of clinical statistics in labor progression

The duration of the first stage, second stage, third stage, and total labor were compared between the two groups.

Table 1: Comparison of labor duration between the two groups (min)

Group	first stage	Second stage of labor	Third stage of labor	total stage of labor
Study group (n=40)	256.13±12.99	41.23±8.99	6.22±1.59	303.59±18.53
Control group (n=40)	321.53±10.46	57.99±10.25	7.59±1.41	386.09±22.39
T	24.8008	7.7747	4.0772	17.9531
P	0.0000	0.0000	0.0001	0.0000

Table 2: Clinical statistical comparison of delivery outcomes [n (%)]

Group	natural labor	Cesarean section
Study group (n=40)	39 (97.50)	1 (2.50)
Control group (n=40)	32 (80.00)	8 (20.00)
χ^2	4.5070	
P	0.0337	

Table 3: Clinical statistical comparison of adverse maternal and infant outcomes [n (%)]

Group	Postpartum hemorrhage	Uterine inertia	Asphyxia neonatorum	Fetal distress	Total
Study group (n=40)	0 (0.00)	1 (2.50)	1 (2.50)	0 (0.00)	2 (5.00)
Control group (n=40)	1 (2.50)	5 (12.50)	2 (5.00)	1 (2.50)	9 (22.50)
χ^2					5.1647
P					0.0230

Clinical comparison of labor pain perception scores

During clinical evaluation of labor pain perception between the two groups, VAS (Visual Analogue Scale) scoring was employed for corresponding assessment, with a score range of 0 to 10 points. The patients' labor pain perception worsened as the VAS score increased.

Clinical statistical comparison of delivery outcomes

The clinical statistics compared the natural delivery rate and the cesarean section rate of the two groups.

Clinical statistical comparison of adverse maternal and infant outcomes

The incidence of postpartum hemorrhage, uterine atony, neonatal asphyxia, and fetal distress was compared between the two groups.

Comparison of clinical statistics in labor progression

The statistical results of each stage of labor and total labor duration in the study group were significantly shorter compared to the control group ($P < 0.05$). (See

Table 1) The duration of the first stage, second stage, third stage, and total labor time were all significantly shorter in the study group compared to the control group ($P < 0.001$ for all comparisons).

Clinical comparison of labor pain perception scores

The mean VAS pain score in the study group was significantly lower than that in the control group (4.23 ± 0.25 vs 7.19 ± 0.85 , $P < 0.001$).

Clinical statistical comparison of delivery outcomes

The rate of natural vaginal delivery was significantly higher in the study group compared to the control group (97.5% vs 80.0%), while the cesarean section rate was significantly lower (2.5% vs 20.0%) ($P = 0.0337$). (See Table 2)

Clinical statistical comparison of adverse maternal and infant outcomes

The overall incidence of adverse maternal and neonatal outcomes was significantly lower in the study group compared to the control group (5.0% vs 22.5%, $P = 0.023$). (See Table 3)

Discussion

Vaginal delivery may be associated with various unpredictable challenges.⁵ Particularly for primiparas, they are more likely to experience tension and anxiety, which can negatively affect maternal cooperation during labor, further prolong the labor process, and increase the mother's sense of pain.⁶ During labor, pain is inevitable, which not only intensifies negative emotions but also significantly undermines the mother's confidence in childbirth.⁷

To alleviate maternal pain, ensure a smooth labor process, and enhance labor control, it is of significant importance to reduce discomfort during delivery.⁸ Free-position delivery allows women to adopt upright or lateral positions during labor, which may facilitate gravitational assistance for fetal descent, improve pelvic alignment, and enhance uterine contraction efficiency. These physiological mechanisms may contribute to shorter labor duration and reduced pain perception.

The findings of this study are consistent with previous research indicating that flexible and upright labor positions can facilitate fetal descent, improve pelvic dimensions, and enhance uterine contraction efficiency. In addition, prenatal interventions such as nutritional support and structured education may improve maternal preparedness, reduce anxiety, and enhance coping mechanisms during labor. The significant reduction in pain scores observed in this study may be attributed to increased maternal mobility, reduced vascular compression, and improved comfort associated with free positioning. Furthermore, the lower rates of cesarean section and adverse maternal–neonatal outcomes suggest that this combined intervention may contribute to safer and more effective delivery processes. These findings highlight the potential clinical value of integrating prenatal care strategies with flexible delivery positioning in routine obstetric practice.

The results of this study showed that, the statistical outcomes of each stage of labor and total labor duration in the study group were significantly shorter compared to the control group. The study group also demonstrated a marked reduction in the pain perception score during delivery compared to the control group. The study group exhibited a significant improvement in the rate of natural

delivery and a significant decrease in the rate of cesarean section compared to the control group. Additionally, the incidence of adverse maternal and neonatal outcomes in the study group was significantly lower when compared to the control group. Analysis revealed that the traditional supine position delivery method, despite its operational convenience, is prone to prolonged labor and increased risks of fetal distress due to the passive positioning.⁹

Moreover, pain management primarily relied on pharmacological interventions without individualized basic guidance, resulting in suboptimal outcomes.¹⁰ In contrast, the comprehensive integration of free positioning delivery guidance and prenatal interventions can improve outcomes through multiple pathways, continuously optimize positional dynamics, actively implement metabolic support, and physiologically regulate pain, thereby synchronizing improvements in maternal and neonatal outcomes. This dual approach of biomechanics and metabolism achieves optimal benefits for both mothers and infants, yielding the aforementioned ideal results.^{11,12}

Strengths and limitations and implications for practice

This study has several strengths. First, it employed a randomized comparative design, which enhances the internal validity of the findings. Second, the study evaluated a comprehensive set of outcomes, including labor duration, pain perception, delivery mode, and maternal–neonatal outcomes, providing a holistic assessment of the intervention. Third, the integration of free-position delivery guidance with structured prenatal intervention represents a practical and clinically applicable approach that can be readily implemented in routine obstetric care. However, several limitations should be acknowledged. The sample size was relatively small, which may limit the statistical power and generalizability of the findings. The study was conducted in a single center, which may introduce selection bias and limit external validity. In addition, the lack of long-term follow-up prevents assessment of sustained maternal and neonatal outcomes. Furthermore, although standardized procedures were followed, potential observer bias in outcome

assessment cannot be completely excluded. The findings of this study have important implications for clinical practice and healthcare policy. The combined intervention of free-position delivery guidance and prenatal care may serve as a cost-effective and non-invasive strategy to improve delivery outcomes and reduce unnecessary cesarean sections. Healthcare providers should consider incorporating flexible delivery positioning and structured prenatal education into routine maternity care. At the policy level, promoting evidence-based, patient-centered delivery practices may contribute to improved maternal and neonatal health outcomes and optimize resource utilization in obstetric services.

Conclusion

In conclusion, the integration of prenatal intervention with free-position delivery guidance can effectively shorten labor duration, reduce labor pain, improve natural delivery rates, and decrease adverse maternal–neonatal outcomes in primiparous women. This combined approach represents a promising strategy for improving obstetric care and enhancing maternal childbirth experience.

Conflicts of interest

The authors declare that there are no conflicts of interest regarding the publication of this paper.

Authors' contributions

Xu Chunli contributed to the study conception and design, data collection, and drafting of the manuscript. Su Xiaochun contributed to data analysis, interpretation of results, critical revision of the manuscript, and supervision of the study. Both authors read and approved the final version of the manuscript and agree to be accountable for all aspects of the work.

Funding

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Data availability

The datasets generated and/or analyzed during the current study are available from the corresponding author on reasonable request.

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