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Effect of Free Position Nursing Intervention on Improving Pain Levels in Primiparas During Natural Childbirth

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Abstract: Objective: To investigate the effect of free position nursing intervention on improving pain levels in primiparas during natural childbirth. **Methods:** 86 primiparas who underwent natural childbirth in the obstetrics department of our hospital from January 2022 to June 2024 were selected and divided into an observation group ($n = 43$) and a control group ($n = 43$) using the random number table method. The control group received the routine delivery nursing model, while the observation group implemented free position nursing intervention on the basis of routine care. The pain degree, delivery time, and neonatal Apgar scores were compared between the two groups. **Results:** The pain level in the observation group was significantly reduced, the duration of the first stage of labor was significantly shortened, and the 1-minute Apgar score of the neonates was higher ($P < 0.05$). **Conclusion:** Free position nursing intervention can effectively alleviate the pain experience of primiparas during natural childbirth, shorten the duration of labor, and benefit maternal and infant health. It is worthy of clinical promotion and application.

Keywords: Free position; Nursing intervention; Natural childbirth; Pain level; Labor duration

Introduction

Natural childbirth, as the fundamental physiological process of human reproduction, remains vital in the context of modern medical development. With the continuous improvement of medical technology and the growing demand for comfortable medical services, reducing labor pain and improving delivery quality while ensuring maternal and infant safety has become a key focus for obstetric staff. Pain, as the primary discomfort during childbirth, not only affects the physical and mental health of the mother but may also adversely impact the progress of labor. Traditional delivery nursing models often require mothers to adopt a fixed supine or semi-recumbent position. Although convenient for medical observation and operation, these positions limit the mother's ability to adjust to the most comfortable posture, potentially leading to restricted pelvic space and obstructed fetal descent, thereby prolonging labor and exacerbating pain [1]. In recent years, the concept of free position delivery has gained increasing attention, allowing mothers to choose various positions—such as standing,

squatting, or side-lying—based on personal comfort and uterine contractions. This approach utilizes gravity to facilitate fetal descent while meeting the mother's psychological needs [2]. This study aims to objectively evaluate the impact of free position nursing on labor pain and provide evidence-based medical grounds for optimizing obstetric care.

1. Materials and Methods

1.1 General Data

A total of 86 primiparas undergoing natural childbirth in our hospital from January 2022 to June 2024 were selected and divided into an observation group and a control group ($n = 43$ each). The observation group's age ranged from 22 to 35 years (average 28.4±3.7); gestational age was 37-42 weeks (average 39.2±1.1). The control group's age was 21-36 years (average 28.1±3.9); gestational age was 37-42 weeks (average 39.0±1.3). The general data were comparable ($P > 0.05$). Inclusion criteria: single pregnancy, cephalic presentation, no cephalopelvic disproportion, and no serious complications. Exclusion criteria: contraindications for vaginal delivery, emergency C-section requirements, or cognitive impairment.

1.2 Methods

Control Group: The parturients in the control group received the routine childbirth care model: Upon admission, routine prenatal examinations and assessments were conducted, and a maternal file was established. After entering the delivery waiting room, they were arranged to rest in a supine position, with regular monitoring of fetal heart tones and uterine contractions. When cervical dilation reached 3 cm, they were transferred to the delivery room and guided to adopt a supine or semi-recumbent position for delivery. During the delivery process, the progress of labor was closely observed, and psychological support and encouragement were provided appropriately. After delivery, the airway was cleared promptly, and preliminary newborn care and Apgar score assessment were performed.

Observation Group: In addition to routine care, the observation group received free-position nursing intervention, with specific contents as follows: (1) Admission assessment stage: The parturient's childbirth wishes and previous childbirth experiences were understood in detail. The advantages and precautions of free-position delivery were explained to the parturient and her family to obtain full understanding and cooperation. (2) Labor waiting period care: The parturient was encouraged to choose different positions such as standing, walking, sitting, and lateral recumbency based on personal comfort. A comfortable labor environment was set up, equipped with auxiliary tools such as yoga balls, birthing chairs, and soft pads. Fetal heart tones were monitored every 30 minutes, and changes in contraction intensity and frequency were recorded. (3) Active phase care: When cervical dilation reached 4-5 cm entering the active phase, the parturient was more actively guided to try various delivery positions. The standing position could utilize gravity to promote fetal descent; the squatting position could enlarge the pelvic outlet diameter; the lateral recumbent position was beneficial for placental blood circulation; the hands-and-knees position could alleviate lumbosacral pain. Nursing staff provided throughout the process companionship, assisting the parturient in adjusting positions and providing technical guidance. (4) Delivery period care: After full cervical dilation, based on the fetal descent situation and the parturient's physical strength, the most suitable delivery position was assisted in choosing. For example, when adopting a squatting position for delivery, a specialized birthing stool was used for support; during lateral recumbent delivery, the upper leg was kept in a flexed state; during semi-recumbent delivery, the bed surface angle was adjusted to 30-45 degrees. (5) Postpartum care: After the fetus was delivered, the parturient was immediately assisted to adopt a comfortable position. Uterine contractions and vaginal bleeding were closely observed, and perineal suturing was performed promptly.

1.3 Observation Indicators

(1) The Visual Analogue Scale (VAS) was used to assess the parturient's pain perception during childbirth. The score range was 0-10, where 0 indicated no pain and 10 indicated unbearable severe pain. (2) Duration of the First Stage of Labor: The time interval from the onset of regular uterine contractions to full cervical dilation. (3) Newborn 1-minute Apgar Score: Scoring was performed according to five items: heart rate, respiration, muscle tone, reflex irritability, and skin color. The maximum score was 10 points.

1.4 Statistical Methods

Data were processed using SPSS 26.0. Counting data used χ^2, and measurement data used *t*-tests. $P < 0.05$ indicated significant difference.

2. Results

2.1 Comparison of Pain Levels

The observation group was lower than the control group ($P < 0.05$). See **Table 1**.

Table 1. Maternal Pain Level Scores ($\overline{x} \pm s$, points)

Group	*n*	Average Score
Observation	43	4.2±1.3
Control	43	6.8±1.7
t-value	-	7.842
P-value	-	< 0.001

2.2 Comparison of First Stage of Labor Duration

The observation group was shorter than the control group ($P < 0.05$). See **Table 2**.

Table 2. Duration of the First Stage of Labor ($\overline{x} \pm s$, min)

Group	*n*	Average Time
Observation	43	426.3±87.4
Control	43	589.7±103.6
t-value	-	7.563
P-value	-	< 0.001

2.3 Comparison of Neonatal 1-minute Apgar Scores

The observation group was higher than the control group ($P < 0.05$). See **Table 3**.

Table 3. Neonatal 1-minute Apgar Score ($\overline{x} \pm s$, points)

Group	*n*	Average Score
Observation	43	8.7±0.9
Control	43	8.1±1.2
t-value	-	2.487
P-value	-	0.015

3. Discussion

Natural childbirth, as the most fundamental human reproductive physiological process, is of paramount importance. However, labor pain has consistently been a significant issue troubling a vast number of parturients. This pain not only affects the maternal physical and psychological experience but may also trigger a series of physiological and psychological responses. These include sympathetic nervous system activation leading to elevated blood pressure and increased heart rate, hyperventilation causing respiratory alkalosis, and anxiety and fear exacerbating pain perception. Traditional childbirth care models emphasize standardization and normalization, requiring parturients to maintain fixed positions during specific periods. While this facilitates observation and operation by healthcare staff, it overlooks individual differences and the subjective feelings of the parturients[3]. In recent years, with the in-depth development of humanized care concepts, free-position delivery has gradually gained attention. Free-position delivery refers to the practice where parturients can autonomously choose the most suitable positions throughout the entire childbirth process based on their own comfort and the characteristics of uterine contractions. These positions include standing, squatting, side-lying, kneeling on all fours, and various other postures. The theoretical foundation of free-position delivery is primarily based on anatomical and physiological principles. Firstly,

different positions can alter the shape and spatial structure of the pelvis[4].

The results of this study showed that the VAS pain scores of parturients in the observation group were significantly lower than those in the control group, indicating that the free-position nursing intervention can indeed effectively alleviate labor pain. Its mechanism of action can be explained from the following perspectives: Firstly, free positioning helps optimize the mechanical structure of the pelvis. When the parturient is in a standing or squatting position, gravity assists in better pressing the fetal head against the cervix, promoting regular cervical dilation and reducing the occurrence of ineffective contractions. Simultaneously, increased mobility of the pelvic joints and appropriate stretching of ligaments facilitate the smooth passage of the fetus through the birth canal. In contrast, the supine position is more likely to result in an occiput posterior fetal position, increasing the difficulty of delivery and the degree of pain. Secondly, changing positions can activate different muscle groups to participate in the birthing process. While standing, the rectus abdominis and pelvic floor muscles contract synergistically to form an effective downward pushing force. In a lateral recumbent position, the iliopsoas and quadriceps muscles relax, reducing pain caused by muscle spasms. The hands-and-knees position can effectively relieve pressure on the sacroiliac joints, alleviating lumbosacral pain. This dynamic muscle coordination mechanism is superior to maintaining a static, fixed position. Thirdly, free positioning addresses the psychological needs of the parturient. Childbirth is a highly individualized process, and each parturient has different pain thresholds and coping mechanisms. Allowing the parturient to choose positions based on her own feelings demonstrates respect for her autonomy, enhances her sense of control and security, and consequently reduces pain perception to a certain extent. Psychological studies have shown that a positive mental state can activate the endogenous analgesic system, releasing natural pain-relieving substances such as endorphins. Finally, the professional guidance and companionship of the nursing staff played a crucial role. During the free-position care process, nurses not only assisted the parturient in selecting suitable positions but also closely monitored changes in labor progress and adjusted care strategies in a timely manner[5]. This personalized nursing service improved maternal satisfaction and reduced pain sensations exacerbated by fear and anxiety.

In this study, the duration of the first stage of labor in the observation group was significantly shorter than that in the control group. Shortening labor duration is of great significance for maternal and infant health, as it can reduce maternal physical exertion and the risk of infection, while also decreasing the incidence of fetal distress. The main mechanisms by which free positioning shortens labor time include: (1) Gravity-assisted effect: Vertical positions such as standing and squatting make full use of gravitational force, allowing the fetal head to press more effectively on the cervix, promoting cervical dilation. (2) Optimization of pelvic space: Different positions can alter the dimensions of the pelvic inlet and outlet. For example, the anteroposterior diameter of the pelvic outlet can increase by 1-3 cm in the squatting position, and pelvic inclination increases in the lateral recumbent position. These changes facilitate fetal descent and rotation. (3) Enhanced muscle coordination: Free positioning allows the parturient to engage more muscle groups in the birthing process, forming a more coordinated and powerful pushing force. In the standing position, the abdominal muscles, diaphragm, and pelvic floor muscles contract synergistically, while in the lateral position, the hip abductor muscles come into play. These are more efficient than the pushing efforts in a supine position alone. (4) Influence of psychological factors: Parturients in free positions feel more comfortable and autonomous, with reduced anxiety. This helps maintain normal endocrine balance, promoting oxytocin secretion and the coordination of uterine contractions.

The 1-minute Apgar scores of newborns in the observation group were higher than those in the control group, indicating that the free-position nursing intervention also positively impacts neonatal outcomes. The Apgar score is an important indicator for assessing the health status of a newborn at birth; a higher score indicates a stronger ability of the newborn to adapt to the external environment. Possible mechanisms by which free positioning improves neonatal outcomes include: (1) Improved placental blood flow: The lateral recumbent position, especially the left lateral position, can reduce uterine pressure on the inferior vena cava,

improving placental blood circulation and ensuring adequate fetal oxygen supply. In the supine position, approximately 25%-30% of parturients may experience supine hypotension syndrome, which affects fetal oxygenation. (2) Reduced umbilical cord compression: Free positioning allows for relative flexibility of the fetal position within the uterus, reducing the chance of umbilical cord compression. Certain positions, such as the knee-chest position, can even help correct mild umbilical cord entanglement[6]. (3) Reduced birth trauma: Due to shortened labor duration and optimized pushing methods, the time the fetus spends in the birth canal is reduced, correspondingly shortening the time of head compression and lowering the risk of intracranial hemorrhage and birth injury. (4) Alleviated stress response: Reduced maternal pain and emotional stability help decrease the fetal stress response, maintaining normal acid-base balance and neurological function.

In conclusion, free-position nursing intervention, as a simple, easy-to-implement, safe, and effective childbirth care model, shows promising application prospects in alleviating pain, shortening labor duration, and improving neonatal outcomes. With the shift in medical models and the deepening of humanistic care concepts, it is believed that free-position delivery will play an increasingly important role in future obstetric nursing practice.

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