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ORIGINAL

EFFECT OF FULL-COURSE NURSING COMBINED WITH LAMAZE PAIN RELIEVING METHOD ON LABOR TIME, PAIN DEGREE, AND BREASTFEEDING RATE OF PRIMIPARA FEMALE ATHLETES ENGAGED IN PHYSICAL ACTIVITY IN NATURAL DELIVERY

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ABSTRACT

Objective: To examine the impact of full-course nursing combined with the Lamaze pain-relieving method on labor duration, pain intensity, and breastfeeding rates in primipara female athletes undergoing natural childbirth. **Methods:** Between August 2020 and August 2022, 124 primipara female athletes in natural delivery were randomized into a control group (routine nursing) and an observation group (full-course nursing with Lamaze method). Newborn health was assessed using the Apgar score, while pain levels and childbirth self-efficacy were evaluated using pain grading and the Simplified Chinese Childbirth Self-Efficacy Inventory (CBSEI-C32). Variables such as labor duration, breastfeeding outcomes, perineal injury, and postoperative complications were compared between the groups. **Results:** No significant differences were found in Apgar scores between the groups at 1, 5, and 10 minutes postpartum ($P > 0.05$). The observation group experienced shorter first and second labor phases and overall labor duration than the control group ($P < 0.05$). Additionally, the observation group reported lower pain levels ($P < 0.05$) and higher scores in outcome efficacy, expectation efficacy, and overall CBSEI-C32 ($P < 0.05$). The cesarean section rate was lower, and the breastfeeding rate was higher in the observation group, with increased lactation volume within the first three days postpartum and shorter initial lactation time ($P < 0.05$). The

observation group also had less severe perineal injuries and a lower rate of episiotomy (P < 0.05). Postoperative complications were fewer in the observation group (P < 0.05). **Conclusion:** Full-course nursing combined with the Lamaze method significantly benefits primipara female athletes in natural delivery by shortening labor, reducing pain, enhancing self-efficacy, improving breastfeeding rates, minimizing perineal trauma, and reducing postoperative complications. This approach appears to be particularly effective in supporting athletic patients through childbirth**.**

KEYWORDS: Primipara Athletes; Lamaze pain relieving method; Natural childbirth; Primipara; labor time; Pain degree; Breastfeeding rate

1. INTRODUCTION

Natural childbirth, while a fundamental physiological process, is often marred by the severe pain it induces, leading to negative emotions such as fear and resistance. These emotional and physical responses can be especially pronounced in female athletes, who may have unique concerns about the impact of childbirth on their physical condition and athletic performance. Primiparas, or first-time mothers, typically face greater psychological stress due to their lack of experience with childbirth. This stress can stimulate the sympathetic nervous system, increasing pain sensitivity and potentially complicating the delivery process(Hautala, Smeds, & Taittonen, 2022).

For athletic primiparas, the physical demands and expectations associated with their sport might further influence their stress and pain perception during childbirth. Pain during labor can exacerbate the body's stress response, hindering the natural delivery process(Zhu, Cui, Wang, Dong, & Xue, 2021).Effective pain management and supportive care are crucial, as evidenced by studies indicating that perinatal analgesic interventions can significantly reduce maternal pain, thereby shortening labor time and promoting smoother deliveries(Liu, Zhang, Wang, Hu, & Ding, 2020).

The Lamaze method, a psychological and physical preparatory technique involving maternal breathing and neuromuscular exercises, has been shown to effectively mitigate maternal pain in natural childbirth (Dursun, Kızılırmak, & Mucuk, 2021). In light of these considerations, this study aims to explore the impact of full-course nursing combined with the Lamaze pain-relieving method on labor time, pain intensity, and breastfeeding success in primipara female athletes undergoing natural childbirth. This approach seeks to not only alleviate the physical and emotional toll of childbirth but also ensure that female athletes can maintain their physical integrity and return to athletic activity postpartum. This study hopes to provide valuable insights and guide the development of targeted intervention measures to facilitate natural deliveries among this unique population.

2. Data and methods

2.1 Clinical Data

A total of 124 cases of primipara with natural delivery from August 2020 to August 2022 were selected as the research objects and divided into control group and observation group by random number table method. This study was approved by the Ethics committee of our hospital, who knew the content of this study and agreed to sign an informed letter. There was no significant difference in the clinical data between the two groups (Table 1).

Table 1: Clinical data

ITEMS	OBSERVATION GROUP (N=62)	CONTROL GROUP (N=62)	X^2/T	P
AGE (YEARS)	26.94 ± 3.52	27.15 ± 4.08	0.307	0.759
BODY WEIGHT (KG)	57.15 ± 8.03	56.83 ± 7.52	0.229	0.819
HEIGHT (CM)	162.58 ± 4.19	163.41 ± 4.37	1.079	0.282
EDUCATION (CASES)			0.157	0.692
HIGH SCHOOL AND ABOVE	43	45		
JUNIOR SCHOOL AND BELOW	19	17		
INTERSPINAL DIAMETER (CM)	24.16 ± 1.37	24.09 ± 1.18	0.305	0.761
INTERCRISTAL DIAMETER (CM)	26.52 ± 1.65	26.74 ± 1.79	0.712	0.478
ILIOPECTINEA EXTERNAL DIAMETER (CM)	19.51 ± 1.12	19.62 ± 1.03	0.569	0.57
INTERTROCHANTERIC DIAMETER (CM)	8.39 ± 0.34	8.27 ± 0.38	1.853	0.066
BIPARIETAL DIAMETER (CM)	83.95 ± 2.95	84.13 ± 3.17	0.327	0.744

2.2 Inclusion criteria

(1) Single pregnancy; (2) Biparietal diameter in the normal range; (3) Full-term delivery; (4) meet the indications of natural childbirth; (5) Primipara.

2.3 Exclusion criteria

(1) Cognitive function; (2) Patients with mental illness; (3) Patients with pregnancy complications or complications; (4) Patients with multiple pregnancies; (5) Patients with hearing disorders.

2.4 Methods

2.4.1 Labor analgesia

All primiparas underwent analgesic delivery and received controlled epidural anesthesia. When the maternal cervix opens three fingers, venous access was established. First, 3 ml of 1% lidocaine was injected and observed

for 5 min to ensure no serious adverse reactions, then 10-15 ml of 0.1% ropivacaine + 1 μg/ml fentanyl was injected, and continued epidural pump administration was performed. Maternal contractions and pain were closely monitored, and according to the specific circumstances, 5 ml of the mixture was injected at an interval of 15 min. The medication was stopped when the cervix was fully opened. After the fetus was delivered, 5 ml of 1 % lidocaine was injected, and the epidural catheter was removed.

2.4.2 Intervention methods of the control group

After admission, the primipara received routine nursing, including health education, question answering, natural childbirth guidance (respiratory guidance, position guidance, etc.)

2.4.3 Intervention methods of the observation group

A one-to-one responsibility midwifery team was set up, and one midwifery nurse was selected as the responsible nurse for each primipara. (1) Prenatal intervention: After admission, the responsible nurse actively communicated with the primipara to initially establish a trusting relationship and carried out two times of concentrated health education, each time for 30 min, mainly explaining the effect of delivery mechanism, skills, and mode. In addition, the responsible nurse performed music training and informed the primipara of the relative function and underlying mechanism. During the period of expectant labor, free activities should be advocated to relax the mood, reduce the psychological burden, familiarize the delivery room, and prompt to be prepared as soon as possible. In the third trimester, the responsible nurse guided the primipara to carry out pelvic floor muscle training, designed delivery plans, and educated Lamaze pain relieving method. First, one-to-one training was carried out to enable primipara to master the skills. In the background of soft music, primipara wore loose clothing in an empty bladder, focused on their favorite objects, and kept a happy mood while doing clearance breathing exercises: sit with eyes in focus, relax, inhale slowly and deeply, and exhale slowly. Neuromuscular control training: clearance breathing first, then tighten unilateral limb muscles, relax, and finally clearance breathing again, once a day, 20 min a time; Breathing skills training: clearance breathing, chest breathing, shallow and slow acceleration breathing, shallow breathing, controlled respiration, and expiration, 15 min each, once a day.

(2) first labor process: the responsible nurse accompanied and communicated with the primipara, patiently explained the knowledge about perinatal period, reasonably evaluated the pain and psychological condition in the prenatal contractions, helped the primipara with poor psychological condition and pain intolerance to massage the abdomen, guided the primipara to abdominal breathing and breath-holding exercise. For primiparas with better

pain tolerance, free movement can be encouraged to accelerate labor progress. Husband or other loved ones was recommended to accompany the primipara to relieve fear and enhance sense of security. When contractions are active, pre-prepared music is played. The husband can cooperate with the primipara to dance slowly to disperse attention and let the primipara in a relaxed and pleasant atmosphere. Meanwhile, the family could massage the abdomen and waist of the primipara with the music rhythm to reduce the discomfort. During the interval of contraction, the response nurse should actively talk with the puerpera to divert attention, and encourage the puerpera to eat more high-calorie, nutritious and digestible food to ensure sufficient physical strength.

(3) Second labor process: the responsible nurse provided position and breathing guidance, offered help during the interval of contractions, and provided adequate maternal food and water. After the cervix is fully opened, the responsible nurse should encourage the primipara with positive words and hold her hands to reduce negative emotions and enhance confidence in childbirth.

(4) Third labor process: after delivery, the condition of the newborn and the primipara should be reasonably assessed, and any abnormality should be dealt with in time. The responsible nurse informed the primipara of the fetus in a timely manner, acknowledged the primipara's efforts, and complimentarily described the fetus. Throughout the delivery room, maternal familiar music was played to create a warm and comfortable atmosphere and to maintain a positive emotion. Furthermore, the responsible nurse informed the primipara of breastfeeding knowledge, guided breastfeeding, let the newborn contact with the primipara as early as possible, and improved the happiness of the primipara.

2.5 Observation indicators

(1) Status of newborns: Apgar score was used to evaluate the physical status of newborns (Gao et al., 2021), including muscle tone, pulse, frowning action (response to stimulation), skin color, and respiration, with 0~2 points for each item, and the total score range was 0~10, with < 7 points indicating the presence of neonatal asphyxia. (2) Labor time: the first labor time, second labor time, third labor time, and total labor time were compared. (3) Pain degree: It was evaluated according to the standards set by the World Health Organization (Dell'Agnolo, Delatore, de Carvalho, Pelloso, & Cardelli, 2022) and divided into 4 grades from 0 to Ⅲ. Grade 0: abdominal acid distension with mild discomfort symptoms. Grade I: abdominal acid distension is more serious than Grade 0, but can be tolerated with less sweating. Grade Ⅱ: Abdominal pain is obvious but tolerable; shortness of breath, sweating more; Grade Ⅲ: severe and intolerable abdominal pain; maternal shouting and crying. (4) Sense of self-efficacy: The simplified Chinese Childbirth Self-Efficacy Inventory (CBSEI-C32) was used to evaluate the self-efficacy (Donate‐Manzanares et al., 2021), including two dimensions of outcome efficacy and expectation efficacy, with 16

items in each dimension. The score for each dimension was 1-10 points, and the higher the score, the better the self-efficacy. Perineal injury: perineal injury and lateral perineal incision rate were compared. (5) Perineal injury degree (Ali, Sultan, Kumar, & Ghouri, 2020): Grade Ⅰ: injury involved labial zonule, perineal skin, and vaginal mucosa; Grade Ⅰ Ⅰ: injury involved the fascia and muscles of the perineal body; Grade Ⅲ: injury involved anal sphincter; Grade IV: injury involved the rectal mucosa. (6) Complications: The incidence of complications such as perineal edema and postpartum massive hemorrhage were analyzed.

2.6 Statistical analysis

SPSS 22.0 software was utilized to process the data. Enumerate data were expressed as % and compared by χ^2 test. Measurement data were expressed by (x ± s) after normal test and compared by independent sample t test between groups and paired sample t test within groups. Ranked data were compared by Z test. $P < 0.05$ meant the difference was statistically significant.

3 Results

3.1 Apgar score

There was no significant difference in Apgar score 1 min, 5 min and 10 min postpartum between the two groups ($P > 0.05$, Figure 1).

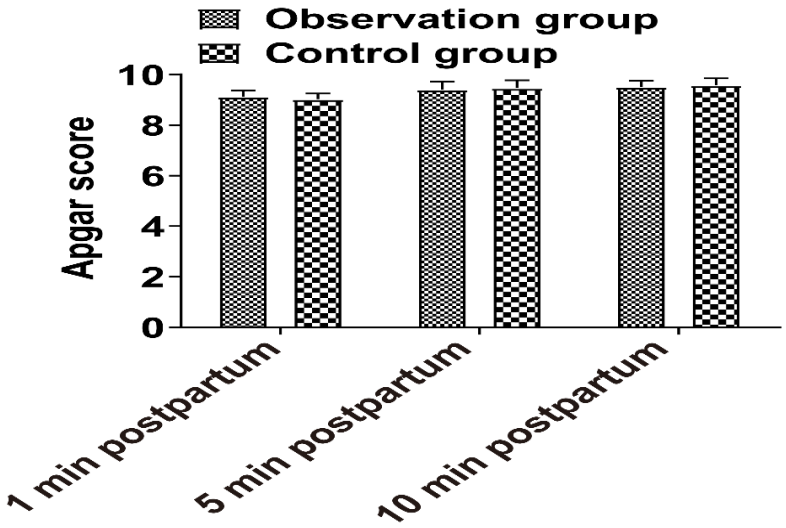

Figure 1: Comparison of Apgar scores

*(**Note:** Compared with observation group, * P < 0.05)*

3.2 Natural labor time

The first labor process time, second labor process time, and total labor

process time in the observation group were shorter than those in the control group ($P < 0.05$, Figure 2).

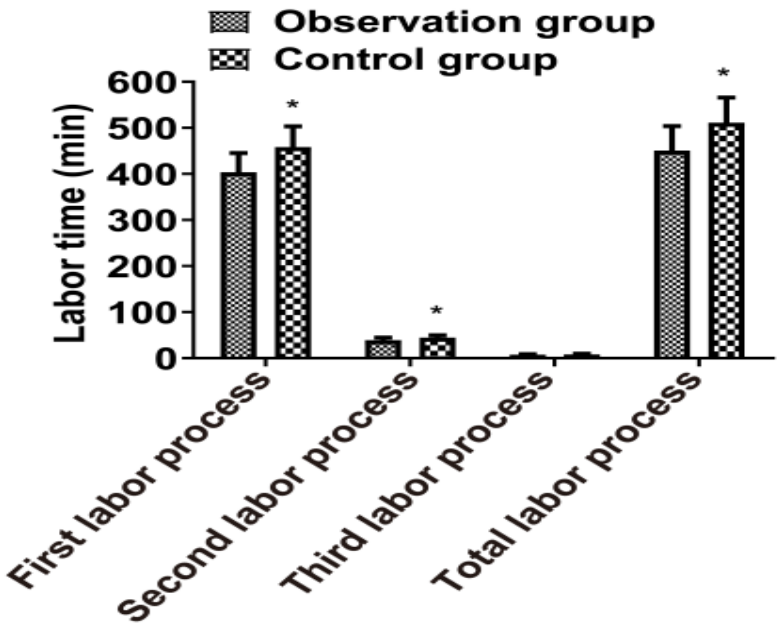

Figure 2: Comparison of natural labor time

*(**Note:** Compared with observation group, * P < 0.05)*

3.3 Pain degree

The pain grade of the observation group was lower than that of the control group ($P < 0.05$, Table 2).

Table 2: Pain degree (cases)

GROUPS	N	GRADE 0	GRADE I	GRADE Ⅱ	GRADE Ⅲ
OBSERVATION GROUP	62	4	39	16	3
CONTROL GROUP	62	2	21	25	14
Z			14.329		
P			< 0.001		

3.4 Maternal CBSEI-C32 scores

There were no significant differences in CBSEI-C32 scores between the two groups before intervention ($P > 0.05$). The outcome efficacy, expectation efficacy, and total score of CBSEI-C32 in the observation group after intervention were higher than those in the control group ($P < 0.05$, Figure 3).

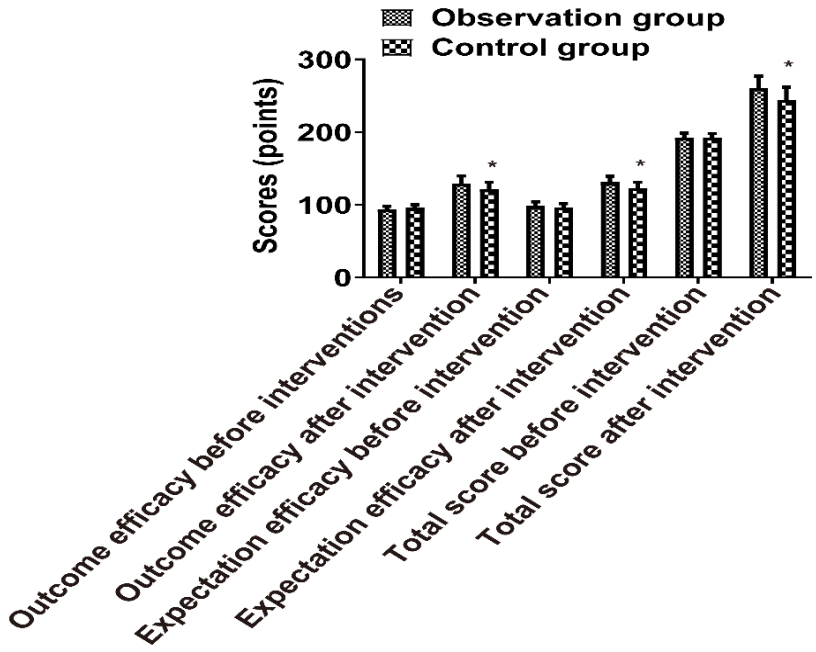

Figure 3: Comparison of maternal CBSEI-C32 scores

*(**Note:** Compared with observation group, * P < 0.05)*

3.5 Breastfeeding and cesarean section rate

Cesarean section rate in the observation group was lower than that in the control group (3.23 % vs 12.90 %), and the breastfeeding rate was higher than that in the control group (95.16 % vs 75.81 %, $P < 0.05$). The lactation volume of the observation group was higher than that of the control group at 3 d after delivery, and the first lactation time was shorter ($P < 0.05$, Figure 4).

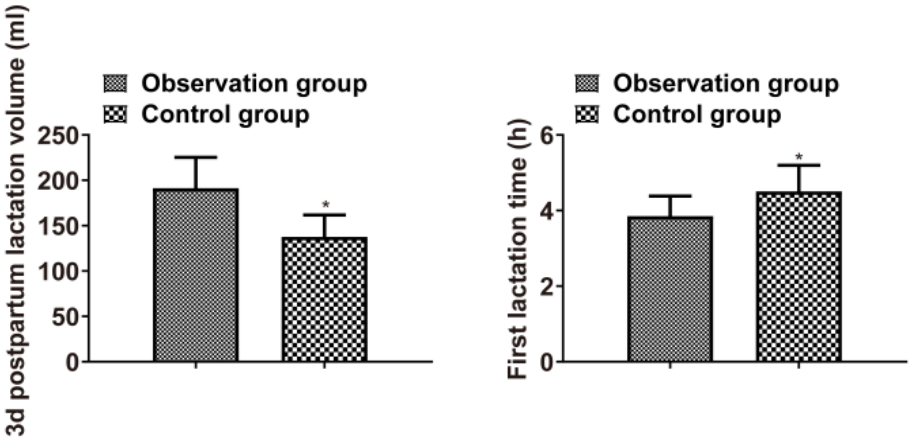

Figure 4: Comparison of breastfeeding

*(**Note:** Compared with observation group, * P < 0.05)*

3.6 Perineal injury

The perineal injury degree of the observation group was less and the

lateral perineal resection rate was lower compared with the control group ($P < 0.05$, Table 3).

Table 3: Perineal injury

GROUPS	N	PERINEAL INJURY			LATERAL EPISIOTOMY RATE
		No injury	Grade Ⅰ	Grade Ⅱ	
OBSERVATION GROUP	62	5	41	16	2
CONTROL GROUP	62	2	38	6	16
Z/X^2		4.361			12.738
P		0.037			< 0.001

3.7 Postpartum complications

The observation group presented lower incidence of postoperative complications than the control group ($P < 0.05$, Table 4).

Table 4: Postpartum complication

GROUPS	N	PUERPERAL URINARY RETENTION	POSTPARTUM HEMORRHAGE	PERINEUM EDEMA	TOTAL RATE
OBSERVATION GROUP	62	1	0	1	3.23 (2)
CONTROL GROUP	62	3	1	4	12.90 (8)
X^2					3.916
P					0.048

4. Discussion

Childbirth is a process in which the fetus and its appendages are separated from the primipara. Under the influence of its own endocrine system, contractions occur to promote the separation of the fetus through the birth canal. Pain is an important factor affecting smooth delivery (Zheng et al., 2020). During delivery, the primipara's uterus contracts violently, and the fetus squeezes the soft birth canal, which can cause nerve impulses to feedback to the brain through nerve endings, producing intense pain. Most primiparas have a low awareness of childbirth pain, prone to negative emotions such as fear and anxiety, and ultimately choose cesarean section. Lamaze pain relieving method for primiparas can alleviate labor pain (Vargas‐Porras, Roa‐Díaz, Hernández‐Hincapié, Ferré‐Grau, & de Molina‐Fernández, 2021). Lamaze pain relieving method is a commonly used breathing and relaxation delivery

technique in clinical practice. It mainly focuses on maternal attention on respiratory control through standardized training of respiratory skills and regulation of neuromuscular, so as to transfer maternal attention and sensitivity to pain and relax neuromuscular. This study found that the pain degree and cesarean section rate in the observation group were lower, suggesting that the intervention could reduce the degree of maternal pain and reduce cesarean section rate. This was mainly because during the full-course-course nursing intervention, the responsible nurse patiently explained the perinatal-related knowledge, reasonably assessed the prenatal contraction pain and psychological status, played the pre-prepared music, guided the family members to massage the abdomen and waist of the primipara, allowed the husband to cooperate with the primipara to dance slowly, and guided the primipara to disperse attention to pain. Compared with vaginal delivery, cesarean section will affect maternal milk secretion (Sangsawang, Deoisres, Hengudomsub, & Sangsawang, 2022). In this study, it was found that the breastfeeding rate and 3 d postpartum lactation volume in the observation group were higher, and the first lactation time was shorter, indicating that the combined nursing intervention could improve the situation of breastfeeding, which was mainly related to the reduction of cesarean section rate.

Previous studies have shown that pregnant women had scarce knowledge but were interested in some non-pharmacological techniques for pain relief during childbirth. The breathing technique, massage, and upright position were described by pregnant women as techniques to alleviate discomfort and for pain relief during labour [26124804-28539008].For primiparas, labor pain is an inevitable problem, and primiparas will show varying degrees of tension and anxiety (Sangsawang et al., 2022). Clinical data show that adverse emotions during childbirth will lead to a series of physiological and pathological reactions, resulting in delayed cervical dilatation and weak contractions, which can further prolong labor time and affect the outcome (Akin, Yilmaz Kocak, Küçükaydın, & Güzel, 2021). In the full-course course of nursing, the responsible nurses carried out health education to improve primipara's delivery knowledge. During delivery, they often communicated with the primiparas, patiently explained the knowledge about perinatal period, reasonably evaluated the pain and psychological status, and gave targeted intervention according to the psychological status of the primiparas, so as to reduce primipara's fear and other emotions. Before delivery, Lamaze pain relieving method was given for intervention. On the one hand, through training of respiratory skills, it can effectively promote the regulation of maternal self-breathing and reduce maternal fear of childbirth. On the other hand, it can guide the primipara to carry out clearing breathing, maintain maternal mental concentration, effectively transfer maternal attention, maintain emotional stability, avoid contraction abnormalities caused by negative psychological emotions, and reduce pain and birth canal injury. Meanwhile, Compared with doula care alone, comprehensive care combined with Lamaze pain relieving

method can shorten the labor time of natural delivery and reduce the degree of pain[33607963].This study analyzed that Lamaze pain relieving method could effectively improve patients' sense of self-efficacy, which was mainly related to the improvement of disease awareness and relief of pain (Nishimaki, Yamada, Okutani, Hirabayashi, & Tanimura, 2022; Veringa-Skiba, de Bruin, Mooren, van Steensel, & Bögels, 2021).

During labor, affected by the soft birth canal and contraction squeeze, pain and burning in the lower abdomen and other places are strong, resulting in difficulty in maternal breathing, thereby leading to excessive physical consumption and prolonged labor time. Relevant studies have pointed out that prolongation of labor and delivery may affect the pregnancy outcome, and lead to neonatal asphyxia in severe cases. Therefore, shortening labor and delivery time is crucial for natural delivery (El Hams, El Najar, & El-Aish, 2021; Ma, Wang, Xiao, & Wang, 2021). In this study, neonatal asphyxia was not found in both groups. In addition, this study found that full-course nursing combined with Lamaze pain relieving method can shorten labor time. The reason is that, by practicing Lamaze pain relieving method, abdominal breathing can adjust the respiratory rate, make the body's blood oxygen supply in the best state, improve tolerance, and relieve pain. During the first labor process, the husband communicates more with the primipara and lets the primipara in a relaxed and pleasant atmosphere, so as to promote the natural delivery. According to relevant reports, prolonged labor and delivery can make the rectum and bladder of the puerpera in compression for a long time, and cause multiple complications such as cervical laceration and hematoma of the vaginal wall, which will affect the recovery after obstetric surgery (Akin, Yurteri Türkmen, Yalnız Dilcen, & Sert, 2022; Buran & Aksu, 2022). Studies have mentioned that Lamaze pain relieving method can reduce the incidence of postoperative complications (Icke & Genc, 2021; Zhang et al., 2021). In this study, the degree of perineal injury in the observation group was less, and the incidence of lateral perineal resection and postoperative complications was lower, indicating that this nursing method can reduce the degree of perineal injury and reduce the incidence of complications, which is mainly related to the intervention can effectively shorten labor and alleviate labor pain.

5. Conclusion

The study confirms that full-course nursing combined with the Lamaze pain-relieving method significantly improves the childbirth experience for primipara female athletes. This approach effectively reduces labor time, diminishes pain levels during delivery, and enhances self-efficacy, which positively influences both the psychological and physical aspects of childbirth. Moreover, it increases the success and early initiation of breastfeeding, contributing to better health outcomes for the newborn. The intervention also leads to fewer perineal injuries and lower incidences of episiotomy, which are

crucial for quicker postpartum recovery. Finally, a reduction in postoperative complications highlights the safety and efficacy of integrating full-course nursing with the Lamaze method, supporting its broader adoption in clinical settings to benefit athletic patients during childbirth.

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