Journal of Clinical and Nursing Research, 2023, Volume 7, Issue 6
http://ojs.bbwpublisher.com/index.php/JCNR
Online ISSN: 2208-3693
Print ISSN: 2208-3685

Effect of Resistance Training, Aerobic Exercise Before Doula-Assisted Delivery on the Psychological Well-Being and Labor Duration of Parturients

Jing Zhou*, Sha Tang, Li Zhou, Cong Jiang, Wenjian Fan

Department of Obstetrics and Gynecology, Second People's Hospital of Banan District, Chongqing 400054, China

Corresponding author: Jing Zhou, CQZJnurse@163.com

Abstract: *Objective*: To investigate the impact of resistance training and aerobic exercise before doula-assisted delivery on the psychological well-being and labor duration of parturients. *Methods*: 105 cases of parturients who gave birth in our hospital from February 2021 to April 2023 were included in this study. The patients were divided into a control group of 52 cases and an observation group of 53 cases. The patients in the control group received no particular intervention before delivery and only received doula assistance. The patients in the observation group received resistance training, aerobic exercise, and doula assistance prior to giving birth. After delivery, the mothers were observed for 2 hours in the delivery room and then returned to the maternal and infant ward. The observation indicators of the two groups were compared. *Results*: In comparison to the control group, the observation group exhibited shorter durations in the first, second, and third stages of labor, as well as the total delivery time. Additionally, the amount of postpartum blood loss at 2 hours was smaller in the observation group. The rate of cesarean section was lower, and the rate of vaginal natural delivery was higher in the observation group. Following the intervention, both groups of postpartum women showed decreased SAS and SDS scores compared to before the intervention. Moreover, the observation group had lower scores than the control group. These differences were all statistically significant ($P < 0.05$). *Conclusion:* Resistance training and aerobic exercise before doula-assisted delivery can effectively improve the psychological state of parturients, shorten labor duration, increase the rate of natural vaginal delivery, and reduce pain and postpartum hemorrhage.

Keywords: Doula assistance; Resistance training; Aerobic exercise; Parturient; Psychological state; Labor duration

Online publication: November 27, 2023

1. Introduction

Mothers often experience different degrees of anxiety, fear, depression, and other negative emotions before vaginal delivery. This leads to low compliance during the delivery process, resulting in a less smooth delivery [1]. Hence, it is essential to implement specific interventions during the perinatal period to ensure the safety of both the mother

and the baby. However, most mothers only receive conventional doula assistance during childbirth. Although it is somewhat effective in increasing the pain tolerance of the mother, its effect is minimal [2]. Resistance training and aerobic exercise are vital components of prenatal training. These methods empower parturients to engage in independent exercises. They find extensive application across various clinical domains and demonstrate a positive impact on the well-being of parturients, leading to shorter labor durations [3]. Therefore, the impact of resistance training and aerobic exercises before doula-assisted delivery on the psychological state and the labor duration of parturients were analyzed in this study.

2. Material and methods

2.1. General information

105 cases of parturients who gave birth in our hospital were included in this study. The selected cases were from February 2021 to April 2023. The parturients were divided into a control group (52 patients) and an observation group (53 patients).

In the control group, there were 41 primiparas and 11 multiparas, with gestational age ranging from 38 to 40 weeks and an average of 39.43 ± 0.21 weeks. The ages of the participants varied from 25 to 40 years, with an average of 30.45 ± 2.28 years. Their body mass index (BMI) fell within the range of 24 to 27 kg/m^2, with an average of 25.43 ± 0.12 kg/m^2. In the observation group, there were 43 primiparas and 10 multiparas. The gestational age spanned from 37 to 40 weeks, with an average of 39.48 ± 0.32 weeks. The participants' ages ranged from 26 to 41 years, with an average of 30.51 ± 2.19 years. The BMI varied between 23 to 26 kg/m^2, with an average of 25.38 ± 0.22 kg/m^2. There were no significant differences in the gestational weeks, ages, and BMIs between the two groups of puerperal women, ($P > 0.05$), indicating that they were comparable. Inclusion criteria: pregnant women with (1) normal pelvic development, (2) normal fetal development, (3) singleton pregnancy, (4) good compliance. Exclusion criteria: pregnant women with (1) an overdue pregnancy or miscarriage, (2) complications during pregnancy, (3) excessive fetal size, and (4) severe heart, liver, kidney, or other organ dysfunctions. The puerperae and their families were duly informed about the study, and they provided their consent and signed the necessary documentation. Besides, this study was also approved by the medical ethics committee of our hospital.

2.2. Methods

The parturients in the control group only received conventional doula assistance, in which parturients were given one-on-one guidance on giving birth. The parturients' uterine contractions and cervix conditions were observed in real time. The parturients were monitored closely and psychological support was given to relieve their anxiety. Besides, the parturients' postures were also corrected according to their needs. The parturients in the observation group received resistance training and aerobic exercise before delivery, along with doula assistance.

The resistance training performed was as follows: One end of the elastic band was secured to the pregnant woman's chest, and the other end was fixed horizontally, extending the elastic band to its maximum length. The training was performed with a frequency of 20 times per group, with a 5-minute interval between each group. There were three groups per session, and this training was conducted twice a week.

The aerobic exercises performed were as follows: (1) Pelvic movement, 2 times/week, 15 min/time. (2) Levator ani exercise, with each group separated by 5 minutes, ten times per group, and three groups per session. (3) Leg movement, 30 times on each side. During all exercises, it was important to maintain even breathing and avoid holding one's breath when exerting force. The parturients were advised to exhale and communicate

any discomfort during the process. The doula-assisted delivery process was similar to that of the control group. After delivery, the mothers were observed for 2 hours in the delivery room and then transferred to the maternal and infant ward.

2.3. Observation indicators

(1) Labor duration: The time of the first stage of labor, the second stage of labor, the third stages of labor, and the total labor time were recorded in detail. (2) Mental state: The self-rating anxiety scale (SAS) [4] and the self-rating depression scale (SDS) [5] were used to evaluate the mental state of the parturients. The scores ranged from 0 to 100 points, with higher scores indicating more severe maternal anxiety and depression. (3) Labor pain levels at different periods: The visual analog scale (VAS) [6] was used to evaluate the degree of pain at the beginning of labor, when the cervix was dilated to 3 cm, and when the cervix was fully dilated. The score ranged from 0 to 10, with a higher score indicating more pain. (4) Delivery outcome: The delivery mode and 2-hour postpartum bleeding of the two groups of parturients were recorded.

2.4. Statistical methods

Statistical analysis was conducted using SPSS 26.0, with statistical significance set at $P < 0.05$. For normally distributed measurement data, a *t*-test was employed to compare the two groups, and the results were presented as (mean ± standard deviation). Enumeration data were compared between the two groups using the χ^2 test, expressed as (case [%]).

3. Results

3.1. Labor duration

The observation group exhibited significantly shorter durations in the first stage of delivery, the second stage of delivery, the third stage of delivery, and the total labor duration when compared to the control group ($P < 0.05$), as shown in **Table 1**.

Table 1. Comparison of labor time between the two groups (min)

Group	Number of cases	The first stage of labor	The second stage of labor	The third stage of labor	Labor duration
Control group	52	584.64 ± 107.52	81.45 ± 34.23	9.43 ± 1.21	681.67 ± 127.89
Observation group	53	433.65 ± 94.87	40.63 ± 10.67	6.12 ± 1.06	476.58 ± 119.46
t		7.634	8.282	14.918	8.494
P		< 0.001	< 0.001	< 0.001	< 0.001

3.2. SAS and SDS scores

Following the intervention, both the SAS scores and SDS scores in both groups of postpartum women decreased compared to their pre-intervention scores. Furthermore, the observation group exhibited significantly lower scores than the control group ($P < 0.05$), as shown in **Table 2**.

Table 2. Comparison of SAS and SDS scores between the two groups (points)

Group	Number of cases	SAS score		SDS score	
		Before intervention	After intervention	Before intervention	After intervention
Control group	52	45.26 ± 4.15	30.54 ± 1.66*	43.71 ± 2.76	29.44 ± 1.76*
Observation group	53	45.35 ± 4.08	24.25 ± 1.35*	43.45 ± 2.85	21.25 ± 1.53*
t		0.112	21.321	0.475	25.462
P		0.911	<0.001	0.636	<0.001

*$P < 0.05$ compared with before intervention.

3.3. VAS scores

There were no significant differences in the VAS scores between the two groups at the beginning of the labor process ($P > 0.05$). However, the VAS scores of the parturients in the observation group were significantly lower than the control group when the cervix was dilated to 3 cm and when the cervix was fully dilated ($P < 0.05$), as shown in **Table 3**.

Table 3. Comparison of VAS scores between the two groups at different stages of delivery (points)

Group	Number of cases	Onset of labor	When the cervix dilates to 3 cm	When the cervix is fully dilated
Control group	52	7.85 ± 1.43	9.34 ± 0.47	9.47 ± 0.44
Observation group	53	7.94 ± 1.41	8.12 ± 0.76	8.25 ± 0.36
t		0.325	9.871	15.563
P		0.746	< 0.001	< 0.001

3.4. Delivery outcomes

Compared to the control group, the observation group had a higher rate of vaginal delivery, a lower rate of cesarean section, and less postpartum blood loss ($P < 0.05$), as shown in **Table 4**.

Table 4. Comparison of delivery outcomes between the two groups (mean ± standard deviation)

Group	Number of cases	Rate of vaginal delivery (case [%])	Rate of cesarean section [case (%)]	Blood loss at 2 hours postpartum (mL)
Control group	52	31 (59.62)	21 (40.38)	201.72 ± 25.43
Observation group	53	46 (86.79)	7 (13.21)	151.63 ± 14.63
χ^2/t		9.913	9.913	12.401
P		0.002	0.002	< 0.001

4. Discussion

Childbirth is a unique physiological process specific to females, involving the full delivery of the fetus and placenta. It commences with regular uterine contractions, gradual shortening of the cervical canal, descent of the fetal presentation, and dilation of the cervix. Among the many factors influencing the emotional state of parturients, endurance, and perinatal pain play crucial roles. Research has shown that over 90% of parturients experience postpartum anxiety, fear, and heightened stress [7,8].

Hence, specific interventions during the perinatal period become necessary to alleviate maternal pain,

enhance emotional well-being, and promote a higher rate of natural vaginal deliveries. Doula-assisted delivery is an approach where a doula encourages the pregnant woman through comforting words and instilling a sense of security to minimize childbirth pain. However, doula-assisted deliveries are often limited to the actual labor process and may not include adequate prenatal interventions for expectant mothers. Consequently, the effectiveness of doula assistance during labor alone might not yield entirely satisfactory results [9,10].

Some studies have shown that prenatal training interventions can significantly boost confidence in natural childbirth and effectively teach parturients to utilize breathing techniques during delivery, which, in turn, helps divert their attention from pain [11]. Aerobic exercise plays a significant role in enhancing maternal energy consumption, preventing fat buildup, and strengthening the lower back and pelvic floor muscles. It also aids in enhancing ligament elasticity and tension, facilitating ligament relaxation. This, in turn, improves the fetus' passage through the birth canal, reduces the duration of labor, increases the rate of natural vaginal delivery, and lowers the risk of postpartum hemorrhage [12]. The results of this study showed that compared to the control group, the observation group had a shorter labor duration, less postpartum hemorrhage, a higher rate of natural vaginal delivery, and a lower rate of cesarean section. This means that resistance training and aerobic exercise can shorten the time of labor, increase the rate of natural vaginal delivery, and reduce the amount of postpartum hemorrhage, which is similar to the research results of Liu *et al* [13].

Furthermore, prenatal resistance training and aerobic exercises have the capacity to stimulate the brain and enhance brain activity by employing appropriate muscle and breathing techniques. This regulation of catecholamines and cortisol levels within the parturient's body leads to a reduction in maternal depression and anxiety, ultimately improving mood. The incorporation of light to moderate-intensity resistance training alongside aerobic exercise enhances maternal muscle strength and endurance while reducing maternal pain [14]. The results of this study showed that the SAS score, SDS score, and VAS score of the observation group were lower than the control group when the cervix was dilated to 3 cm and when the cervix was fully dilated, indicating that resistance training and aerobic exercise can effectively improve the mother's psychological state and reduce pain, which is similar to the research results of Ma [15].

5. Conclusion

In summary, resistance training and aerobic exercise before doula-assisted delivery can effectively improve the maternal psychological state, shorten the labor process, increase the rate of natural vaginal delivery, and reduce pain and postpartum hemorrhage.

Disclosure statement

The authors declare no conflict of interest.

References

[1] Wang J, Li L, Wang S, 2021, The Effect of Narrative Nursing Combined with Six-Step Breast Massage on Maternal Lactation and Postpartum Psychological State. Journal of Nursing, 36(23): 35–37.

[2] Wang X, Wang J, Yang L, 2020, Application of Doula Labor Analgesia Device in Full-Term Primipara and its Impact on Delivery Outcomes. Chinese Maternal and Child Health Care, 35(24): 4693–4695.

[3] Wang J, Xu F, Kang Z, et al., 2019, Efficacy and Safety Analysis of Individualized Resistance Training Combined with Aerobic Exercise on Low Back Pain During Pregnancy. Journal of Neck and Back Pain, 40(5): 671–673.

[4] Yan Q, Yi Y, Li Q, 2021, Analysis of the Impact of Predictive Nursing on Postpartum Hemorrhage in Vaginal Delivery Women. Journal of Chengdu Medical College, 16(5): 645–647.

[5] Yao C, Wan L, 2021, Application of Nursing Based on Improved Early Warning Score in Cesarean Section Women. China Medical Herald, 18(5): 185–188.

[6] Pan X, Zhang H, Zhou Y, et al., 2022, The Application Value of Ropivacaine Combined with Dexmedetomidine Transversus Abdominis Plane Block in Patients with Cesarean Section. Chengdu Medical College Journal, 17(2): 197–200.

[7] Mszar R, Mahajan S, Valero-Elizondo J, et al., 2020, Sociodemographic Variations in Prenatal Cholesterol Screening Among Pregnant Women in the United States: The National Health Interview Survey. Journal of Clinical Lipidology, 14(4): 556–557.

[8] Li H, Liu X, Chu L, et al., 2019, The Effect of Personalized, Comprehensive Nursing Care on Neonatal Infection in Women with Premature Rupture of Membranes. Hebei Medicine, 41(1): 156–159.

[9] Ren Z, Peng X, 2019, Effects of Traditional Chinese Medicine Acupoint Massage Combined with Doula Delivery on Negative Emotions, Breast Tenderness, and Delivery Outcomes of Primiparas. Journal of Hunan University of Traditional Chinese Medicine, 39(5): 658–662.

[10] Wang X, Wang J, 2021, Clinical Efficacy and Risk Factors Analysis of Doula Application in Labor Analgesia. Medical Clinical Research, 38(2): 298–300.

[11] Roland CB, Knudsen SP, Alomairah SA, et al., 2021, Structured Supervised Exercise Training or Motivational Counseling During Pregnancy on Physical Activity Level and Health of Mother and Offspring: FitMum Study Protocol. BMJ Open, 11(3): 43–67.

[12] Silva-Jose C, Nagpal TS, Coterón J, et al., 2022, The 'New Normal' Includes Online Prenatal Exercise: Exploring Pregnant Women's Experiences During the Pandemic and the Role of Virtual Group Fitness on Maternal Mental Health. Pregnancy Childbirth, 22(1): 251.

[13] Liu Z, Zhang S, 2018, The Effect of Husband and Doula Accompaniment on Labor Time, Delivery Outcome, and Satisfaction During Delivery. Chinese Modern Doctor, 56(8): 59–62.

[14] E G, Liu W, Yang H, et al., 2022, Effects of Daily Interval Aerobic Resistance Exercise on Blood Sugar Control and Delivery Outcomes in Patients with Gestational Diabetes Mellitus. Chinese Journal of Practical Nursing, 38(29): 2241–2246.

[15] Ma L, 2021, The Application Effect of AIDET Standard Communication Mode Combined with Doula Delivery in Primipara. Chinese Sexology, 30(2): 100–103.