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A Study on the Clinical Effect of Chiropractic Combined with Acupoint Therapy in Preventing Feeding Intolerance in Very Low Birth Weight Infants

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Abstract: ***Objective:*** *To explore the effect of chiropractic combined with acupoint therapy in preventing feeding intolerance in very low birth weight infants (VLBWI).* ***Methods:*** *A total of 98 VLBWI admitted in the Neonatal Intensive Care Units (NICU) from July 2022 to February 2023 were randomly divided into the control group (n=49) and the experimental group (n=49). The control group received conventional Western medical treatment and care, while the experimental group were given chiropractic combined with acupoint therapy. The incidence of feeding intolerance, complications, duration of full oral feeding, meconium evacuation time, length of hospital stay, and weight gain werecompared between the two groups.* ***Results:*** *The incidence of the feeding intolerance and associated complications in the experimental group were significantly lower than those of the control group (P<0.05). The duration of full oral feeding, meconium evacuation time, hospital stay in the experimental group were significantly shorter than those of the control group (all P<0.05).The weight gain in the experimental group was higher than that of the control group (P<0.05).* ***Conclusion:*** *Chiropractic combined with acupoint therapy can effectively prevent feeding intolerance and its associated complications, expedite the transition to full oral feeding, promote meconium evacuation, reduce hospital stay, and enhance the growth and development of VLBWI.*

Keywords: Chiropractic, Acupoint therapy, Very low birth weight infants, Feeding intolerance**.**

1. Introduction

The World Health Organization data shows that the global prevalence of preterm births is 11.1% [1]. Currently, China has more than 1.17 million preterm births each year, ranking second in the world [2], among which very low birth weight infants (VLBWI) account for 7.79% of the total number of preterm births [3]. VLBWI, due to their small gestational age, underdeveloped and insufficient gastrointestinal tract, low digestive enzyme activity, and limited absorption function, are prone to feeding intolerance [4], leading to insufficient intake of nutrients, slow growth and development, prolonged hospitalization, and increased risk of hospital-acquired infections, which seriously affect their prognosis and quality of life [5]. Maintaining a balanced and adequate nutritional supply is one of the important factors for the survival of VLBWI and a key factor affecting their prognosis. Studies have shown that acupoint therapy has the effects of invigorating the spleen and improving digestion, and has a good regulatory effect on the improvement of various symptoms of spleen deficiency [6]. Zhang Fan et al. [7] listed the application of acupoint therapy to improve feeding intolerance in preterm infants, which has achieved positive effects in shortening the time for full oral feeding and hospitalization. However, acupoint therapy has not yet shown a significant promoting effect on improving the suckling ability of preterm infants. Acupoint therapy can improve the suckling ability of preterm infants, promoting the maturation of the suckling reflex through sequential, regular, and rhythmic acupoint massage using Chinese medicine acupoints [8]. Yuan Guilong et al. [9] applied acupoint therapy combined with acupoint therapy to effectively treat feeding intolerance in preterm infants. Based on this, this study explores the effect of nursing intervention with acupoint therapy combined with acupoint therapy on feeding intolerance in VLBWI. The following is the report:

2. Clinical Data

Using convenient sampling method, VLBWI admitted to our Neonatal Intensive Care Unit (NICU) from July 2022 to February 2023 were selected as the research subjects. Inclusion criteria: 1) Birth gestational age <37 weeks, weight <1500g; 2) Premature infants capable of enteral nutrition; 3) Family members signing informed consent, willing to participate. Exclusion criteria: 1) With birth injury, severe asphyxia, congenital digestive tract malformation, respiratory distress syndrome, hereditary metabolic disease; 2) Those with worsening condition during the study, transferred to other hospitals and died. The sample size was estimated according to the formula for comparing the means of two samples, considering a 20% dropout rate, and the final sample size determined was 106. The research subjects were divided into the experimental group and the control group using the random number table method, with 53 cases in each group. The experimental group had 4 dropouts (transferred to other hospitals), and the control group had 4 dropouts (3 transferred to other hospitals, 1 abandoned treatment), with a final collection of 49 cases in each group. There was no significant difference in general information of VLBWI between the two groups (P>0.05), as shown in Table 1.

3. Method

The control group VLBWI was given routine western medicine treatment and nursing according to the Guidelines for the Management of Premature Infants [10] during

hospitalization, and all nursing care was completed by the responsible nurse. 1) Health education for family members at admission, including intensive care unit visit system, inquiry about premature infant illness time, mother how to maintain lactation and breast milk storage and transportation [11]; 2) Mother participates in parenting knowledge training, including physiological characteristics of premature infant, feeding method, kangaroo nursing, diaper change, bath bath, umbilical nursing, defecation and urination, treatment of spitting milk and choking milk, milk volume recording, etc. On the basis of the control group, the experimental group was given chiropractic combined with acupoint therapy nursing intervention.

3.1 Establishment of Chiropractic Combined Acupoint Therapy Research Group

The research group consisted of 1 chief nurse, 1 deputy chief physician of neonatal department, 1 deputy chief physician of traditional Chinese medicine department, 3 chief nurses and 2 nurses. The members of the group were medical staff with more than 3 years of working experience. The chief nurse serves as the group leader and is responsible for the implementation and supervision of the project: the deputy chief physician of the Department of Neonatology serves as the consultant and is responsible for evaluating the condition of VLBWI and determining the intervention opportunity; the deputy chief physician of the Department of Traditional Chinese Medicine and the chief nurse are responsible for formulating the operation table of chiropractic combined acupoint therapy, and the chief nurse is responsible for the operation and ensuring the stable vital signs of premature infants during the operation; the nurse is responsible for regular follow-up, sorting out data and statistical analysis.

3.2 Training Panel Members

The associate chief physician of the Department of Traditional Chinese Medicine shall uniformly conduct offline training on the knowledge related to chiropractic combined acupoint therapy for the members of the group to ensure the quality. The training includes chiropractic and acupoint massage. Training 3 times a week, 30 min each time, 2 weeks in total. The associate chief physician of the department of traditional Chinese medicine shall conduct theoretical and practical examination on the training contents, and the chiropractic combined acupoint therapy shall be implemented only after passing the examination. After each chiropractic treatment, the nursing duration and skin condition were recorded.

3.3 Nursing Intervention of Chiropractic Combined with Acupoint Pressing Therapy

The vital signs of VLBWI were evaluated by the doctor in charge before chiropractic combined with acupoint pressing, twice a day, 1 hour after feeding each time. The procedure can be performed from 10:00 and 15:00 after vital signs are stable to the day of discharge. Specific operation methods: 1) Chiropractic method: the responsible nurse washed and disinfected both hands, VLBWI took prone position, and used "three-finger kneading method" to massage the back, with the thumb at the bottom, food and middle fingers at the top, starting from the top of gluteal fissure (Changqiang point), moving forward alternately with both hands along the skin on both sides of the spine in the middle of the back, pushing and pinching to the upper Dazhui point of the spine, with moderate strength. One time of one-way kneading from bottom to top is one time, and the cyclic operation is 6 times, 3 min each time. 2) Acupoint therapy: Lubricate acupoints with emollient oil, VLBW take prone position, press Rubbing Pishu Point and Weishu Point, and then switch to supine position in turn.Press and knead Zhongwan, Hegu and Zusanli. Acupoint location method: Pishu point is located at the eleventh thoracic spine under the spinous process to the right side of the two horizontal fingers; Weishu point is located at the twelfth thoracic spine under the spinous process to the right side of the two horizontal fingers; Zhongwan point is located at the lower end of the sternum to the midpoint of the umbilicus; Hegu point is located in the middle of the first and second metacarpal bones, VLBWI five fingers together after the highest muscle of the back of the hand; Zusanli point is located at the outer side of the calf, knee depression downward four horizontal fingers. All are based on VLBWI finger width, and the width of two fingers is about 1.5 inches. Pishu, Weishu, Hegu, Zusanli manipulation: gently press the point with the finger pulp, rotate to the right; Zhongwan manipulation: press the point with the thumb, rotate left and right Turn back and forth push button. Each time pressing each point for 1min, the manipulation from light to heavy. During chiropractic therapy, the nurse in charge had a kind attitude, kind language and gentle movements. Grasp the chiropractic and acupoint massage with slight redness of skin. Observe VLBWI complexion, vital signs and local skin changes during operation. If VLBWI is abnormal, stop immediately and take corresponding measures.

3.4 Effect Evaluation

3.4.1 Feeding intolerance According to the criteria proposed by the American Academy of Pediatrics in Guideline [12], any of the following conditions are considered feeding intolerance: 1) Abdominal skin discoloration or severe abdominal distension; 2) Bloody stools; 3) Gastric retention ≥ 25%~50% of the total amount of interval feeding 2~3 times; 4) Vomiting or bile reflux; 5) Marked bradycardia or apnea; 6) Marked cardiorespiratory dysfunction. Therefore, severe abdominal distension, vomiting, bloody stools or positive occult blood in stool, significant increase in gastric retention, and unsatisfactory increase in milk volume are the main indicators for clinical judgment of whether feeding intolerance has occurred.

3.4.2 Feeding intolerance complications Record the incidence of intrahepatic cholestasis and necrotizing enterocolitis during the ICU stay of the two groups of very low birth weight infants (VLBWI).

3.4.3 Full Oral Feeding Duration Record the time from partial bottle-feeding to full independent oral feeding. Time for complete meconium evacuation Record the time when meconium turns yellow.

3.4.5 Length of Hospital Stay Total number of days from admission to NICU to discharge for very low birth weight infants (VLBWI).

3.4.6 Weight Gain Status Record the weight of the two groups of VLBWI at 14 days, 21 days, and the day of discharge.

3.5 Statistical Methods

SPSS23.0 statistical software package was used for data analysis. The numerical data were expressed as the number of cases and percentages, and the X-test was used for comparison between groups. The mean and standard deviation were used to describe the normal distribution of continuous data, and M (P25, P5) was used to describe the normal distribution of continuous data, and the t-test or rank sum test of two independent samples was used for comparison between groups.

4. Result

Table 1: Comparison of general data of VLBWI between the two groups

	Experimental group(n=49)	Control group(n=49)	Test	*P*
Gender				
Female	23(46.94)	24(48.98)	χ^2=0.041	0.840
Male	26(53.06)	25(51.02)		
Mode of delivery, n (%)				
Vaginal	25(51.02)	27(55.10)	χ^2=0.164	0.686
Caesarean	24(48.98)	22(44.90)		
Gestational age (weeks), Mean ± SD	35.81±0.55	35.85±0.76	t=0.259	0.796
Birthweight (kg), Mean ± SD	1.35±0.14	1.38±0.10	t=0.953	0.343
Start feeding time(h), Mean ± SD	69.32±0.88	68.97±1.06	t=-1.793	0.076
First defecation time(h), Mean ± SD	5.33±0.66	5.15±0.71	t=-1.297	0.198

Table 2: Comparison of the incidence of VLBWI feeding intolerance between the two groups[n(%)]

	Experimental group(n=49)	Control group(n=49)	Test	*P*
Abdominal distension	1(2.04)	3(6.12)		
Vomiting	2(4.08)	5(10.20)		
Bloody stools	0(0.00)	2(4.08)	χ^2=5.33	0.021
Gastric retention	0(0.00)	1(2.04))		
Total	3(6.12)	11(22.45)		

Table 3: Comparison of the incidence of feeding intolerance complications between the two groups during hospitalization for VLBWI

	Experimental group(n=49)	Control group(n=49)	Test	*P*
Intrahepatic cholestasis	0(0.00)	3(6.12)		
Ecrotizing enterocolitis	2(4.08)	5(10.20)	χ^2=4.009	0.045
Total	2(4.08)	8(16.33)		

5. Discussions

5.1 Chiropractic Combined with Acupoint Pressing Therapy Can Effectively Prevent Feeding Intolerance in VLBWI and Reduce the Incidence of Feeding Intolerance Complications.

The results of Table 2 in this study show that the incidence of feeding intolerance in the experimental group was 6.12%, while in the control group it was 22.45%, with a statistically significant difference (P<0.05). This indicates that the combined therapy of acupoint pressing and massage therapy can effectively prevent the occurrence of feeding intolerance in VLBWI. Some studies have shown that both acupoint pressing and massage therapy are effective methods for alleviating feeding intolerance in VLBWI, which can unblock meridians, regulate yin and yang, and achieve the purpose of improving the internal organs [13-15]. This study implemented methods such as grasping, pressing, pushing, lifting, kneading, and pressing on the back skin of VLBWI through the combined therapy of acupoint pressing and massage therapy, stimulating the central nervous system through surface receptors of the body, utilizing neural reflexes to improve gastrointestinal function, and achieving the effect of improving digestion and assisting in spleen function [6], thereby effectively preventing the occurrence of feeding intolerance in VLBWI. The results of Table 3 show that the incidence of complications associated with feeding intolerance in the experimental group was 4.08%, while in the control group it was 16.33%, with a statistically significant difference (P<0.05). This indicates that the combined therapy of acupoint pressing and massage therapy is beneficial in reducing the incidence of feeding intolerance complications during hospitalization in VLBWI. The combined therapy of acupoint pressing and massage therapy has the effects of harmonizing yin and yang, promoting saliva and blood circulation, and eliminating stagnation, which can increase peristalsis, promote the generation of bilirubin, and increase bile secretion and bilirubin excretion, reducing the formation of unconjugated bilirubin in the enterohepatic circulation, effectively reducing the incidence of intrahepatic cholestasis in premature infants. This study found that the combined therapy of acupoint pressing and massage therapy can enhance the contraction ability of gastrointestinal muscles, accelerate peristalsis to absorb or expel the accumulated gas and fluid in the intestinal lumen, thereby alleviating abdominal distension and reducing the incidence of necrotizing enterocolitis.

5.2 Chiropractic Combined with Acupuncture Therapy can Accelerate the Complete Oral Feeding Process of VLBW and Promote Fetal Excretion

The results of Table 3 in this study show that the time for the experimental group to achieve complete oral feeding with VLBVI was (8.61±1.32)d, and the time for the control group to achieve complete oral feeding was (14.22±1.74)d, with statistically significant differences (P<0.001). This indicates that the combination of acupoint therapy and massage therapy is beneficial for accelerating the process of complete oral feeding in VLBWI. Due to the lack of perception and pleasure in obtaining food in VLBWI, achieving complete oral feeding becomes difficult and slow [16]. Acupoint therapy is achieved by pressing the spleen point, stomach point, middle warmer point, Hegu point, and Zusanli point, transmitting the stimulation to the brain to excite the vagus nerve, balancing yin and yang, unblocking meridians, thereby regulating human body function, achieving the effect of digestion and defecation, promoting gastrointestinal motility, and increasing the suckling reflex in infants [8]. The results of this study also show that the time for the experimental group to completely excrete meconium in VLBWI was (64.56±2.96)h, and the time for the control group to completely excrete meconium was (74.84±2.38)h, with statistically significant differences (P<0.001). This study shows that through the

stimulation of acupoint therapy, the secretion of gastrin, plasma gastrin, and insulin in VLBWI can be increased, improving intestinal motility, promoting digestion, and thus improving the delayed emptying of gastric contents caused by insufficient motility [17-18]. The combination of acupoint therapy and massage therapy not only promotes the maturation of the suckling reflex in VLBWI but also accelerates the excretion of meconium, reduces the incidence of feeding intolerance, and has a good synergistic effect on the suckling, digestion, and excretion of VLBWI, which is worthy of clinical application.

5.3 Chiropractic Combined with Acupoint Therapy can Effectively Shorten the Length of Hospital Stay for VLBWI

This study's Table 4 results show that the median hospitalization time for the experimental group of very low birth weight infants (VLBWI) was 27 days, and the median hospitalization time for the control group was 31 days, with a statistically significant difference ($P<0.05$), indicating that the combination of acupoint pressing and massage therapy can effectively shorten the hospitalization time of VLBWI. Newborns, due to the horizontal position of the stomach, small stomach volume, underdeveloped esophageal sphincter, and well-developed pyloric muscle, are prone to vomiting and regurgitation [19]. The immaturity of the digestive system poses a major challenge to the nutritional absorption of premature infants, which is easy to lead to slow growth and development, and prolonged hospitalization time [20]. This study, through acupoint pressing, forms a benign stimulation to the Du meridian and the Bladder meridian of the foot Taiyang, promotes the circulation of Qi and blood throughout the body, achieving the therapeutic effect of "regulating Yin and Yang, regulating Qi and blood, and harmonizing the viscera" on the body, and can improve feeding intolerance symptoms caused by small stomach volume, slow intestinal peristalsis, poor suckling power, relaxed esophageal sphincter, and insufficient gastric motility [21], thereby accelerating the time for full oral feeding, promoting the growth and development of VLBWI, and shortening the hospitalization time.

6. Summary

In the NICU, the nursing intervention of combined acupoint pressing and massage therapy can not only prevent the occurrence of feeding intolerance in very low birth weight and preterm infants (VLBWI), but also accelerate their complete oral feeding process, promote the excretion of meconium, shorten hospitalization time, thereby reducing the incidence of intrahepatic cholestasis and necrotizing enterocolitis, and further promote their growth and development. Due to the limitations of research time and other factors, this study is still lacking in the evaluation of the home feeding effect of VLBWI after receiving combined acupoint pressing and massage therapy. In the future, follow-up visits can be conducted to further explore the impact of this method on improving the home feeding effect of VLBWI after discharge, in order to observe more comprehensively the role of combined acupoint pressing and massage therapy in preventing feeding intolerance in VLBWI.

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