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*Original Article*

# Effect of kangaroo mother care method on pain, growth and breastfeeding in newborns

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**Abstract:** Objective: To analyze and explore the effects of kangaroo mother care on pain, growth and breastfeeding in newborns. Methods: A total of 78 newborns were selected and divided into a control group and an observation group using a random number table. The control group received routine nursing care, and the observation group was given kangaroo mother care. The score of Neonatal Pain Assessment Scale (NIPS), sleep quality and physical development were compared between the two groups. The feeding patterns at 42 days after birth were also compared. Results: The score of NIPS, sleep quality and physical development in the observation group were significantly better than those in the control group (all $P<0.05$), and more newborns in the observation group adopted breastfeeding ($P<0.05$). Conclusion: Kangaroo mother care can relieve the pain during painful operations, increase the breastfeeding rate, and improve the sleep quality in newborns.

**Keywords:** Kangaroo mother care, neonatal pain, physical development, sleep quality, feeding pattern

## Introduction

With the change of the fertility policy in China, a birth peak occurred. The average annual number of newborns between 2017 and 2018 was about 16,545 million [1, 2]. Under the higher demand for neonatal care, it's an urgent problem for obstetrics and gynecology nursing staff to solve how to provide nursing services of high-quality to mothers and newborns [3, 4]. Breastfeeding has been less applied in recent years due to many objective reasons, though it's the most comprehensive and highly economical feeding method currently. Therefore, nursing staff need to find more reasonable nursing methods to further improve breastfeeding success [5]. In addition, a series of routine tests are performed on the newborns, such as intramuscular injections, subcutaneous injections, blood collection from the feet, and routine blood glucose monitoring, which can cause pain in the newborns. Also if not performed properly, these tests can bring adverse effects on blood pressure, blood oxygen saturation and intracranial pressure to the newborn [6]; in some cases, even hinder the physical and intellectual development [7]. As a result, current nursing methods need to be converted for promoting the healthy development of newborns. In recent years, kangaroo mother care (KMC) has been widely used abroad and has achieved satisfactory clinical effects. The KMC is a novel nursing method that maintains skin contact between the newborn and its mother, along with the timely follow-up to the mother to ensure the proper KMC process. The KMC process has been reported to improve the physical condition of the newborn and the mother [8]. Since the idea has not spread in China so far, this study will discuss the impact of KMC on pain, growth and breastfeeding in newborns in China [9].

## Materials and methods

### *Materials*

A total of 78 newborns were randomly selected in the Maternity and Child Care Center of Xinyu, Women and Children's Hospital of Xinyu from July 2017 to August 2019; including 40 male and 38 female newborns. They were randomly divided into the control group and the observation group. This study was approved by the

Ethics Committee of Maternity and Child Care Center of Xinyu, Women and Children's Hospital of Xinyu. All parents have signed the informed consent.

Inclusion criteria: The gestational age of the newborn is between 37-42 weeks; the birth weight of the newborn is between 2,500-4,000 g; the newborn has no congenital malformations or other diseases; Apgar score at 1, and 5 minutes after birth is between 8-10 points [10]; newborn was delivered by vaginal delivery, and the amount of bleeding during delivery was no more than 1,000 mL; no placenta or fetal membrane was retained after delivery; and the newborn was breastfed after birth.

Exclusion criteria: The mother of the newborn had pregnancy complications such as gestational diabetes and gestational hypertension; the mother of the newborn had infectious diseases such as hepatitis and syphilis; or the newborn had a history of asphyxia.

*Methods*

The newborns in the control group received routine postpartum care methods. First, the nursing staff cleaned the respiratory tract of the newborn, then cut and ligated the umbilical cord, and finally washed the newborn with warm water. After that, the height, weight and head circumference were measured. The newborn also received vitamin K1 injection. Then the newborn was given a bracelet to wear and was clothed.

In the observation group, newborns received KMC in addition to the routine nursing care. The room temperature was kept at 25-28°C while the doors and windows were closed to protect the baby and the mother from any drafts. After the routine postpartum care was completed, the newborns were given KMC. During KMC, the mother took a semi-recumbent position with the upper body clothing removed; the newborn was placed naked between the mother's breasts at a prone position [11, 12].

For 3 consecutive days after birth, the two groups of newborns were given corresponding nursing care twice a day for 1 hour each time, 10:00 am to 11:00 am in the morning, and 4:00 pm to 5:00 pm in the afternoon.

*Observational indicators*

The clinical data of the two groups were recorded and statistically analyzed. In this study, the Neonatal Pain Assessment Scale (NIPS) was used to assess the pain during blood glucose testing with heel acupuncture after birth; the sleep quality assessment was performed using the newborn sleep quality questionnaire 30 days after birth. There are three items in the questionnaire: sleep disturbances, sleep latency and sleep duration. Sleep quality was rated as: 1) poor: easy to wake up, each sleep duration lasts 1-2 hours difficult to fall asleep, difficult to comfort after waking up or crying; 2) good: not easy to wake up, and each bought of sleep lasts for 3-4 hours, easy to fall asleep and quiet after waking up; 3) fair: the sleep quality is between the above two metrics. Good sleep quality rate = the number of (good sleep quality + fair sleep quality)/ total number * 100% [13]. Later in the study, telephone follow-up was performed to check the feeding method of the two groups after 42 days of birth.

*Statistical analysis*

All data were analyzed with SPSS 20.0 statistical package. Measurement data were expressed as mean ± standard deviation and differences between groups were evaluated using independent t-test. Enumeration data were expressed as number/percentage (n/%) and differences between groups were compared by $\chi^2$ test. A *P* value less than 0.05 was considered significant.

## Results

*Comparison of baseline conditions*

In this study, a total of 78 newborns were selected, including 40 males and 38 females. There were no significant differences in the baseline conditions between the two groups (P>0.05), as shown in **Tables 1** and **2**.

*Comparison of the score of NIPS*

The NIPS scores in the observation group were significantly lower than those in the control group (P<0.001), as shown in **Table 3**.

**Table 1.** Comparison of baseline conditions of the newborns

| Group | Control group | Observation group | $t/\chi^2$ | P |
|---|---|---|---|---|
| Gender | | | 0.549 | 0.736 |
| Male | 21 | 19 | | |
| Female | 18 | 20 | | |
| Gestational age (week) | 40.17±0.84 | 40.06±0.79 | 0.985 | 0.587 |
| Body weight at birth (g) | 3270.20±344.40 | 3312.10±373.40 | 1.194 | 0.473 |
| Height (cm) | 49.69±1.6 | 49.96±1.64 | 1.471 | 0.932 |
| Head circumference (cm) | 34.26±0.21 | 34.23±0.23 | 1.162 | 0.426 |
| Apgar score | | | | |
| 1 min | 8.91±0.18 | 8.90±0.19 | 0.843 | 0.674 |
| 5 mins | 9.97±0.11 | 9.97±0.13 | 0.761 | 0.841 |
| Blood glucose at birth (mmol/L) | 4.67±1.43 | 4.65±1.47 | 0.983 | 0.753 |

**Table 2.** Comparison of baseline conditions of the mothers

| Group | Control group | Observation group | t | P |
|---|---|---|---|---|
| Age (year) | 28.37±3.85 | 28.03±3.59 | 0.751 | 0.461 |
| Gravidity | 1.83±0.43 | 1.79±0.39 | 1.482 | 0.324 |
| Parity | 0.37±0.28 | 0.41±0.26 | 0.918 | 0.506 |
| Duration of labor (h) | 6.95±2.81 | 7.03±2.41 | 0.381 | 0.674 |
| Bleeding (mL) | 201.68±74.05 | 206.73±71.28 | 0.891 | 0.487 |

**Table 3.** Comparison of NIPS score

| Group | NIPS score |
|---|---|
| Observation group (n=39) | 1.90±0.53 |
| Control group (n=39) | 3.13±0.62 |
| t | 10.215 |
| P | <0.001 |

Note: NIPS, Neonatal Pain Assessment Scale.

*Comparison of sleep quality at 30 days after birth*

The sleep quality of the observation group was significantly better than that of the control group (P<0.05), as shown in **Table 4**.

*Comparison of physical measurements at birth and at 30 days after birth*

The physical measurements of the observation group were significantly better than those of the control group (P<0.05), as shown in **Table 5**.

*Comparison of breastfeeding success rate at birth and feeding pattern at 42 days after birth*

In the observation group, the breastfeeding success rate at birth was significantly higher than that of the control group (P<0.05), as shown in **Table 6**. The comparison of feeding pattern at 42 days after birth is shown in **Figure 1**.

## Discussion

Recent years have witnessed an increasing birth rate in China. However, there exist some drawbacks to the current newborn nursing care methods [14]. The traditional nursing care cannot satisfy the needs of newborns and their mothers, which may seriously affect the physical health of the newborns. Therefore, in-depth research on this aspect is in high demand [9]. For the purpose of newborns' healthy development, KMC was introduced to clinical practice, which allows newborns to have close skin contact with their mother. The mother will also receive timely follow-up to confirm the KMC process. KMC has been reported to improve the physical condition of newborns and their mothers, and it is currently widely used in developed countries [15, 16].

Previous studies have found that KMC could effectively alleviate the pain of newborns caused by acute invasive procedures, and in turn prevent the decrease of blood oxygen

**Table 4.** Comparison of sleep quality (n (%)

| Group | Good | Fair | Poor | Good sleep quality rate |
|---|---|---|---|---|
| Observation group (n=39) | 26 (66.67) | 12 (30.77) | 1 (2.56) | 38 (97.44) |
| Control group (n=39) | 20 (51.28) | 15 (38.46) | 4 (10.26) | 35 (89.74) |
| $\chi^2$ | | | | 0.765 |
| P | | | | 0.039 |

**Table 5.** Comparison of physical development at birth and 30 days after birth

| Group | Observation group (n=39) | Control group (n=39) | t | P |
|---|---|---|---|---|
| At birth | | | | |
| Body weight (g) | 3270.20±344.40 | 3312.10±373.40 | 0.983 | 1.029 |
| Height (cm) | 49.6±1.6 | 49.96±1.64 | 1.471 | 0.932 |
| Head circumference (cm) | 34.2±0.33 | 34.1±0.42 | 1.172 | 0.825 |
| 30 days after birth | | | | |
| Body weight (g) | 4985.5±610.2 | 4288.7±674.5 | 16.708 | 0.000 |
| Height (cm) | 53.5±3.5 | 51.3±2.8 | 8.213 | 0.012 |
| Head circumference (cm) | 35.9±1.7 | 34.5±2.1 | 6.800 | 0.027 |

**Table 6.** Comparison of breastfeeding success rate at birth

| Group | Successful | Unsuccessful |
|---|---|---|
| Observation group (n=39) | 26 (66.67) | 13 (33.33) |
| Control group (n=39) | 16 (41.03) | 23 (58.97) |
| $\chi^2$ | | 4.381 |
| P | | <0.05 |

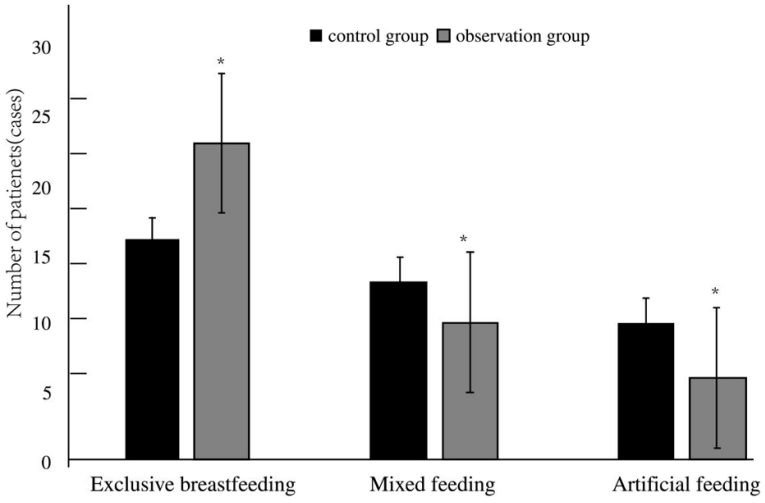


**Figure 1.** Comparison of feeding pattern at 42 days after birth. Compared with control group, *P<0.05.

saturation and rapid heart rate [17, 18]. In this study, compared to the control group, the significantly lower NIPS score in the observation group provided further support to the fact that KMC could reduce the pain perception of the newborns.

The neonatal stage is key to establishing a sleep pattern. KMC can provide a more comfortable sleeping environment for newborns [19, 20]. After comparing the sleep quality of the two groups at 30 days after birth, we found that the observation group had significantly better sleep quality than the control group. This study found that the physical development of the observation group was also significantly better than that of the control group, which is related to the fact that KMC can provide positive stimulation to the newborn's skin and help to enhance systemic immune function.

Clinical research has shown that if the newborn sucks the nipple frequently, the pituitary gland of the mother will be stimulated to secrete prolactin. This behavior has an important role in establishing the lactation in the early stage. In this study, the observation group achieved higher breastfeeding

success rate at birth and better established feeding pattern in comparison of the control group. Clearly, the application of KMC can help the mother with a better recovery of physiological functions, which is conducive to the establishment of breastfeeding pattern [21].

In conclusion, the use of KMC after birth can effectively alleviate the pain of the newborn, increase the breastfeeding success rate, and improve sleep quality. However, the newborns selected for this study were term neonates born naturally by vaginal delivery, and the effect of KMC on premature and cesarean section newborns needs further verification. In addition, in spite of KMC guidelines after discharge, poor long-term compliance was found in some cases during follow-up. Therefore, further studies are needed to track feeding patterns and physical development of the babies at 4 months and later.

## Disclosure of conflict of interest

None.

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