



Original Article

Effect of Neuro-Development Treatment on motor development in preterm infants

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Abstract. [Purpose] To investigate the effects of Neuro-Development Treatment on development in the preterm infants. [Subjects and Methods] A total of 96 premature infants were recruited for this study; 62 low birth weight preterm infants (<2.5 kg, high risk infants for developmental delay) and 34 premature infants (>2.5 kg, low risk infants for developmental delay). High risk infants were divided into intervention group (32 infants) and control group (30 infants) at time of admission. Low risk infants were into comparative group (34 infants). All infants received general nursing care in Neonatal Intensive Care Unit. Additionally, Intervention group received Neuro-Development Treatment for 15 minutes 4 times per week up to 40 week postconceptional age. We evaluated Test of Infant Movement Performance at baseline, 2 weeks after and 40 week postconceptional age. [Results] In score on Test of Infant Movement Performance there was more increase in intervention group than in control group and comparative group. [Conclusion] According to findings in this study, we find that Neuro-Development Treatment in Neonatal Intensive Care Unit has an effect on development in the preterm infants.

Key words: Neonatal Intensive Care Unit, Preterm infant, Neuro-Development Treatment

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INTRODUCTION

Preterm is the symptom that can be economic and psychological burdens at the national level. Even though not all preterm or low birth weight babies necessarily have disabilities or problems, infants of preterm birth and low birth weight are considered as high risk infants and show different developmental process compared to normal mature infants¹⁾. Considering this phenomenon, there should be measures seeking for the prevention of preterm birth. At the same time, apart from the survival issue of preterm infants, the ultimate goal of caring newborn babies should be focused on the post-survival issues, such as nerve developmental prognosis and improvement of health and quality of life. Necessity for the active and early intervention strategies and follow-up management is increasing in order to positively induce growth and development of preterm babies and to detect functional abnormalities at the early stage. Early detection of developmental delay and early intervention can minimize the subsequent problems and lead to the functional improvement in the long term²⁾. Therefore, this study attempts to identify effects of early Neuro-Developmental Treatments (NDT) implemented in Neonatal Intensive Care Units (NICU) on the development of preterm infants.

SUBJECTS AND METHODS

This study implemented research on 96 preterm infants hospitalized in NICU. Ethical approval was given by the Pusan Marie Hospital Committee of Medical Ethics (IRB 2012-76), and consent was obtained from the infants' mothers. Babies with birth weight lower than 2.5 kg were classified as low birth weight preterm infants with higher risk of developmental delay,

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and babies with birth weight of 2.5 kg and higher were classified as preterm infants with lower risk of developmental delay. Among low birth weight preterm infants lower than 2.5 kg, 32 babies hospitalized earlier were assigned to the intervention group and 30 babies hospitalized later were assigned to the control group. 34 preterm infants with birth weight of 2.5 kg and higher were assigned to the comparison group. General preterm nursing treatments were provided equally to all intervention, control and comparison groups. For the intervention group, apart from the general nursing treatments, additional NDT were provided for 15 minutes, 4 times a week, until post-conceptual age of 40 weeks. To identify effects of NDT on the development of preterm infants, totally 3 times of assessments were conducted: the initial assessment was conducted before the intervention, intermediate assessment was conducted at the second week after the intervention, and the final assessment was conducted after the intervention was completed at the post-conceptual age of 40 weeks. For the developmental assessment of preterm infants, Test of Infant Motor Performance (TIMP) was used. This TIMP is a tool developed by Campell to measure the motor maturity level of mature babies or preterm babies with high risks from the post-conceptual age of 32 weeks to the corrected age of 4 months³).

The results of the study were analyzed using SPSS Windows 22.0 software. The significance level of α for the all statistical data was set to 0.05. The mean comparison of developments in the intervention group (pre-and post-interventions), comparison group and control group was analyzed using one-way ANOVA.

RESULTS

The aggregated total scores of motor performance in the initial assessment before the intervention did not have significant difference between the intervention group and control group, however, the scores were significantly lower than the comparison group ($p < 0.01$). However, in the final assessment conducted after the intervention was completed at the post-conceptual age of 40 weeks, the motor performance scores of the intervention group were significantly improved compared to the control group ($p < 0.01$) (Table 1).

DISCUSSION

The purpose of this study was to investigate effects of early NDT administered to low birth weight preterm infants with high risk of developmental delay on the development of preterm infants. The result of the study showed that the intervention group of low birth weight preterm infants with NDT had more developmental improvement compared to the control group without the intervention. Furthermore, it showed that the intervention group overtook the development speed of the comparison group of preterm infants with lower risk of developmental delay. The control group without the intervention did not show significant difference compared to the comparison group at post-conceptual age of 40 weeks. However, compared to the intervention group with NDT, the control group showed lower achievement in the development. This indicates that NDT improved development of preterm infants. Kleberg and coworkers⁴) reported the result of conducting a development program from the 3rd day after a preterm infant was born until the post-conceptual age of 36 weeks and then conducting a follow-up research after 3 years later and found that the program had positive effect on the children's behavioral development and interaction with their mothers. Lekskulchai and Cole⁵) conducted a low birth weight preterm infant development program from post-conceptual age of 40 weeks to corrected age of 4 months through parent education after discharge from hospital and found that preterm infants in intervention group achieved higher improvement of motor performance compared to the control group. Even though it was not statistically significant, it was even higher improvement compared to the motor performance of the comparison group of preterm infants with lower risks. This confirms the effect of early developmental treatment programs and consists with the result of the present study. Brain development depends on complex interactions between genes and environmental experiences, and the early sensory information and motor experiences can affect formation of the brain^{6, 7}). Movements generate sensory input, contribute to organizing of motor sensory cortex, and influence vitalization of perceptions through movements. Therefore, appropriate sensory information at the early stage and motor experiences facilitate the brain's maturity to increase development. This, in turn, improves cognitive, social, and interactional relations of children. However, Stimuli that are not tailored and that are given generally and widely could accelerate abnormal postural tensions and movements of low birth weight preterm infants⁸). Considering this, it would be necessary to conduct research on the optimum degree of interventional stimuli for improvement of preterm infants as well as research on safety issues of preterm infants in the future.

Table 1. Motor development between the 1st, 2nd, and 3rd assessment (N=96)

	Intervention (n=32)	Comparative (n=30)	Control (n=34)
Pre-test**	27.2 ± 7.3 ^b	42.5 ± 12.6 ^a	26.7 ± 8.7 ^b
Mid-test**	54.2 ± 10.5 ^a	51.0 ± 9.5 ^a	38.9 ± 10.2 ^b
Final-test**	70.8 ± 6.5 ^a	56.3 ± 7.9 ^b	53.8 ± 7.5 ^b

Values are mean ± SD (score). Significant difference ** $p < 0.01$, ^{a, b}Values with different superscripts within the same columns are significantly different at $p < 0.01$

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