

The effect of mothers' empowerment program on premature infants' weight gain and duration of hospitalization

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ABSTRACT

Background: The readiness of mothers to take care for infants at discharge is a critical issue. Poor readiness of mothers in taking care of premature infants at the time of discharge is associated with potential adverse consequences. This study examined the effect of implementing mothers' empowerment program on the weight gain and duration of hospitalization in premature infants.

Materials and Methods: This study was a quasi-experimental before–after study with a control group, in which 80 mothers with premature infants who were hospitalized in NICU Level II of two hospitals were recruited in the study. Mothers' empowerment program was implemented as a three-stage training program for the intervention group. Mothers' readiness questionnaire was completed by the mothers before the intervention and at the discharge time. The changes in mean of mothers' readiness scores were compared in both the groups.

Results: The mean of daily weight gain in infants of the intervention group (3.95 g) was significantly higher than that of the infants in the control group (–0.9 g) ($P = 0.003$). The average duration of hospitalization for infants in the intervention and control groups was 15.45 days and 20.95 days, respectively, showing a statistically significant difference ($P = 0.003$).

Conclusions: Providing training to the mothers regarding how to care for premature infants can be a useful and effective method in the process of weight gain of premature and low-birth newborns, and may shorten the duration of infants' hospitalization.

Key words: Duration of hospitalization, empowerment, empowerment program, hospital stay, infant, intensive care unit, neonatal, premature, premature infant, weight gain

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INTRODUCTION

The preterm infant is a living infant born before 37 weeks of pregnancy.^[1] More than half a million babies – one in every eight – are born preterm each year, and the number is increasing steadily. The National Center for Health Statistic released the final birth data for 2005, showing that the preterm birth rate, the percentage of babies born at less than 37 weeks of gestation, is continuing to rise, with more than 12.7% born prematurely. The preterm birth rate has increased from 12.5% in 2004, and is projected to continue its upward trend and reach 12.8% in

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2006.^[2] With scientific advances and improved technologies of the last few decades in neonatal intensive care, the survival rate of premature infants with low birth weight has increasingly improved.^[3] However, many complications and problems are still experienced by infants, family, society, and the health system.^[4]

Due to their physiological problems, premature infants have complex needs and treatments, and substantial care measures, including hospitalization in the neonatal intensive care unit (NICU).^[5] In addition to the initial cost of infants' hospitalization and care, admission in the NICU may lead to developmental disorders such as those affecting child's future abilities, Attention Deficit Hyperactivity Disorder (ADHD), visual and motor problems, lower IQ, developmental delays, and behavioral problems.^[6]

One of the best and most effective ways of mitigating damages and injuries following hospitalization is through parental involvement in infants' care measures.^[7] It is necessary for the parents to actively cooperate in taking care of their infant, which is called family-centered care.^[8] While taking care of the preterm infant, mothers' sense of partnership and confidence improve. Active participation of parents in taking care of the preterm infant increases the parents' ability to improve infant's development and reduces the duration of hospital stay, thereby decreasing the economic costs and the risk of nosocomial infections.^[9] Furthermore, this kind of care would raise the staff's satisfaction, creating a positive feeling to provide better services.^[10] Also, implementing educational and training programs does not need modern equipment and is very economic compared to the high costs involved in the management of mental and behavioral disabilities.^[11]

Recent studies report different kinds of nursing interventions (kangaroo care, massage therapy, breastfeeding education, etc.) as effective interventions to increase parents' partnership and empowerment in taking care of their preterm infant.^[12] Creating Opportunities for Parent Empowerment (COPE) is one of the programs that make the parents participate actively in their infants' care. This program was designed by Dr. Bernadette Melnyk in 2001. COPE is a behavioral-educational program with the aim of facilitating participation of the parents and interaction with their children.^[4,13]

One of the most important measures that such nurses can take to reduce parental problems in NICU is to empower the parents by providing the necessary information and conditions that facilitate their participation in taking care of their infant in the new environment they are faced with.^[14] The aim of this study was to examine the effect of the

empowerment program on the length of hospital stay and the weight of preterm infants hospitalized in NICU.

MATERIALS AND METHODS

In this quasi-experimental study with non-equivalent control group post-test design conducted on 80 mothers and their premature infants, the subjects were recruited by purposive sampling based on the inclusion criteria and assigned to either experimental or control group. A randomized design was not applicable because of the concern the researchers had about data contamination.

The study was conducted in the NICU Level II of two hospitals affiliated with Guilan University of Medical Sciences, Iran, in a period of 5 months (from November 2013 to March 2014). The mothers' inclusion criteria for entry into the study were as follows: Age above 18 years, able to read and write in Persian language, no history of having a baby that received services in the NICU in previous pregnancies, not having any physical illness disturbing the routine activities, Not having obvious neurological and psychiatric disorders requiring medication, and having scores less than 7 in terms of readiness for discharge. The inclusion criteria for infants included: Gestational age between 28 and 34 weeks, birth weight under 2500 g, singleton delivery, and having no congenital anomalies. The subjects from both hospitals were first placed in the control group, and after discharging the last subject of the control group, sampling of the intervention group was begun. Initially, 88 mother-infant pairs were enrolled in the study (43 in the experimental group and 45 in the control group). Eight mothers were eliminated from the study because of the following reasons: Their infant's death ($n = 4$), not attending the intervention according to the protocol ($n = 2$), and confirmed diagnosis of a significant congenital anomaly ($n = 2$).

The tools for data collection included demographic data form and "Parent Discharge Readiness" questionnaire, and the weighing device. The weighing device used in this study was the portable Seca 337 scale, made in Germany, which has the capability of measuring a maximum weight of 16 kg and a minimum weight of 500 g and an error of 5 g. To control the calibration of the scale, 10 standard weights of 500–5000 g controlled by two other scales were weighed by the used scale to assure its accurate measurement. All the research measurements before and after the intervention were taken and recorded using a weighing device by a research assistant and the researcher with the infants being without any clothing, covering, or diaper.

Parent Discharge Readiness questionnaire was designed by Vincent Smith *et al.* in 2009. It consists of 14 items in

two aspects of technical and emotional readiness. The Parent Discharge Readiness questionnaire was used at the time of admission of the infant to the NICU to determine overall readiness of mothers. If they reported their readiness with a score less than 7 (an inclusion criterion), they were considered as unready and included in the study. The Parent Discharge Readiness questionnaire was also used to evaluate mothers' readiness on discharge day by themselves and a nurse, independently.

After obtaining approval of the ethical committee of Tehran University of Medical Sciences and administrative processing, necessary coordination with the relevant authorities of the two hospitals was made. Written consent was obtained from mothers to participate in the study, and confidentiality of the information and the study objectives were explained to them.

A booklet was provided as a training supplement. This booklet had three parts. The content of this illustrated booklet was organized in line with the three phases of the educational intervention program. The study intervention included educating the mothers of preterm infants about the program of empowerment. The validity of the educational content of the program was confirmed by a specialist pediatrician, a nurse, and a matron of NICU and two professors from the School of Nursing and Midwifery, Tehran University of Medical Sciences.

The intervention for the experimental group consisted of three phases. Each phase was carried out in a 30–60 min session regularly and based on the intervals considered according to the mothers' preference, meaning that the first, second, and third phases were conducted within a time frame of third to fourth days after birth, 2–4 days after the first stage, and 1–3 days before discharging the baby, respectively. The sessions were held in the form of lecture presentation, in addition to face-to-face training, question and answer, group discussion, and participation of mothers in infant daily care measures. The parts related to training regarding the infant's appearance and participation in care measures were presented at infant bed and other trainings were provided in the mothers' room in the ward and with the presence of the same infant's mother in each session. Necessary explanation was given about the physical environment of NICU and equipment, and the appearance, characteristics, and behaviors of premature infants were shown to the mother in the first session. Also, the sleep-awake patterns of premature infants, signs of stress in premature infants and ways to relieve them, and the role of parents in caring of premature infants were presented. In the second session, the following were discussed: The best time to interact with the infant and proper principles and methods

of daily routine care for a premature infant (such as feeding, bathing, maintaining body temperature and proper clothing, replacing diaper, and care of the umbilical cord). Then, the mothers took part in caring their premature infants. The last session was devoted to the following: The role of mothers in preparation for transition of infant from hospital to home; how to establish an effective and consistent relationship with the infant, with an emphasis on the required screening tests, vaccination, needed medications such as multivitamins with their correct dosage and the administration method; and how to contact the NICU and infant specialists when necessary. The steps of the study are shown in Figure 1.

Data analysis

SPSS version 19.0 for Windows (SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Descriptive statistics were used to give a general picture of participants' demographics. Means were compared using paired *t*-test.

RESULTS

According to the purpose of this study, the following hypotheses were tested:

- Length of stay in the hospital is shorter in preterm infants whose mothers receive empowerment programs compared to those in the control group

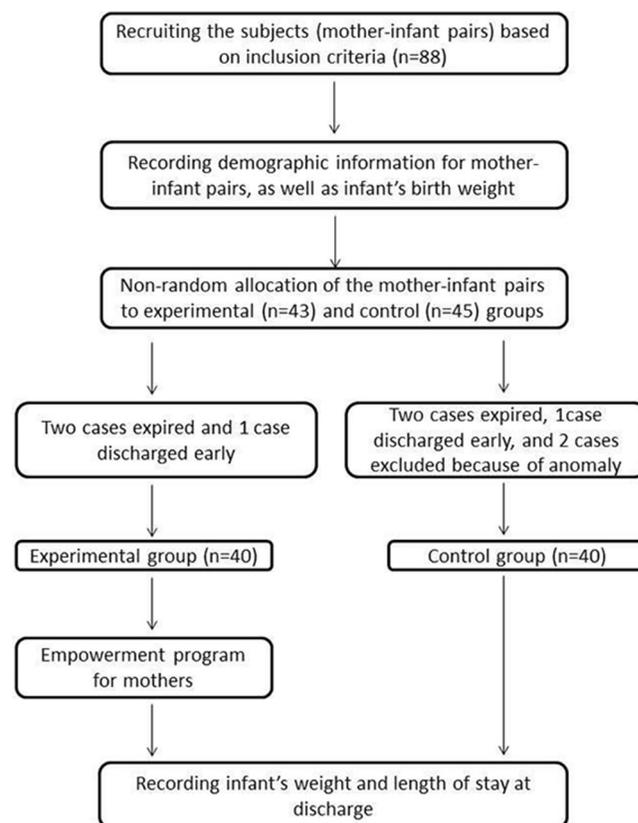


Figure 1: The steps of the study

- Daily weight gain during hospitalization is higher in preterm infants whose mothers receive empowerment programs compared to those in the control group.

Demographic characteristics of the infants are shown in Table 1.

Most of the mothers were housewives (85%) and had education level under diploma (55%). Most of them were experiencing their first pregnancy (73.7%). Of the total number of infants, 91.25% had no problem except for prematurity and 90% were breathing without assistance device during the intervention. Half of the infants were fed with a combination of breast milk and formula (51.25%). Also, 70% were fed through a combination of breastfeeding, cup, and spoon in mixture (70%). There was no statistically significant difference between the two groups in terms of type and method of infant's feeding.

Abilities of mothers of the two groups that was evaluated using the mothers' readiness questionnaire showed no significant differences in caring premature infants at the beginning of hospitalization, in technical skills ($P = 0.152$) and emotional skills ($P = 0.355$), as well as in infant gender, mothers' age, parental education levels, number of pregnancies, gestational age, mode of delivery, Apgar score at minute five, and infant problems except for prematurity.

The mean birth weight for infants in the control group was 1773 g with an SD of 480.77 g, while their mean weight at discharge was 1795 g with an SD of 387.32 g. In the intervention group, the mean birth weight was 1732 g with an SD of 475.21 g, while their mean weight at discharge was 1831 g with an SD of 437.39 g. As shown in Table 2, there were no statistically significant differences between the birth weights of infants in the control and intervention groups ($P = 0.706$). Also, the discharge weight of infants between the two groups showed no statistically significant differences ($P = 0.699$), while the mean weight gain of infants in the experimental group (98.25 g with an SD of 152.95 g) was significantly higher than that of those in the control group (21.87 g with an SD of 143.44 g) ($P = 0.024$). As the intervention group infants were discharged on an average 5.5 days earlier than the control group infants, we also compared the daily weight gain between the two groups. Although the mean of daily weight gain of infants in the intervention group (3.95 g with an SD of 6.82 g) was statistically higher than that of those in the control group (-0.9 g with an SD of 7.24 g) ($P = 0.003$), this amount of daily weight gain is not clinically remarkable.

The average length of stay for infants in the control group was equal to 20.95 days (with an SD of 9.120), which was

Table 1: Demographic characteristics of infants

Variable	Frequency (%)	
	Control group (n=40)	Experimental group (n=40)
Gender		
Male	25 (62.5)	23 (57.5)
Female	15 (37.5)	17 (42.5)
Type of delivery		
Vaginal delivery	15 (37.5)	16 (40)
Cesarean	25 (62.5)	24 (60)
5-min Apgar score		
≤7	30 (75)	36 (90)
>7	10 (25)	4 (10)
Gestational age (weeks)		
<30	6 (15)	8 (20)
30-32	13 (32.5)	15 (37.5)
>32	21 (52.5)	17 (42.5)
Maternal age (years)		
≤23	11 (27.5)	10 (25)
24-29	16 (40)	17 (42.5)
30-35	9 (22.5)	11 (27.5)
≥36	4 (10)	2 (5)

Table 2: Comparison of the means of birth weight, weight at discharge, total weight gain, and daily weight gain between the two groups

Variable	Control group (n=40)		Experimental group (n=40)		t value	P value
	Mean	SD	Mean	SD		
Birth weight (g)	1773	480.77	1732	475.21	0.379	0.706
Weight at discharge (g)	1795	387.32	1831	437.39	-0.388	0.699
Total weight gain at discharge (g)	21.87	143.44	98.25	152.95	-2.304	0.024
Daily weight gain (g)	-0.9	7.24	3.95	6.82	-3.079	0.003

SD: Standard deviation

5.5 days longer than that of infants in the intervention group wherein the average was 15.45 days (with an SD of 7.053). At discharge, a statistically significant difference was found between the groups in terms of total weight gain and daily weight gain.

DISCUSSION

The results of this study showed that the mean weight gain of infants of mothers in the intervention group had a significant increase compared to that of infants of mothers in the control group. Borimnejad *et al.* examined the effect of empowerment program on the preterm infants' weight 2 months after discharge from the NICU. They recruited 140 mother-infant pairs in the study and allocated them

randomly to the experimental and control groups. Two months after implementing the empowerment program, the mean scores for attachment behaviors and infants' weight in the experimental group were significantly higher than those of the control group.^[15]

Also, these findings are consistent with the results of Ferber *et al.*'s study that reported a statistically significant difference between the control group and two treatment groups (a group massaged by trained mothers and a group massaged by trained personnel) in terms of weight gain in the second half of the study, i.e. between days 6 and 11.^[16]

Beheshtipoor *et al.* conducted a study to examine the effect of implementing an empowerment program on the weight of 100 preterm infants. They reported that their program was not effective. It might be attributed to the short period of the study. Normally, infants lose 5–10% of their weight at the early days after birth and start to gain weight again after 2 weeks.^[17]

Also, Lee found no statistically significant differences in weight gain of infants after 4 weeks of massage in both groups. But he suggested that massage therapy by mothers is beneficial for infants due to improvement of maternal and infant relationship.^[18] In Iran, most of the studies have investigated the effects of touch therapy and kinesthetic stimulation by trained personnel on infants in ICU and the role of the mother's constant care and her empowerment has been less considered.

According to the findings of this study, the mean duration of hospital stay in the experimental group showed a significant reduction compared to the control group after the educational intervention. Ortenstrand *et al.* assessed the effect of parents' participation in caring 366 preterm infants on the hospitalization length and neonatal morbidity and found that parents' participation had a strong influence on the hospital stay of most preterm babies in such a way that a 5-day reduction was seen in the length of stay of infants. It was also found that parental involvement can have a direct effect on the stability of infants' condition and their morbidity.^[19] The results of the current study also correspond with this study.

Beheshtipoor *et al.*'s study entitled "The effect of family-based empowerment program on the weight and length of hospital stay of preterm infants in the neonatal intensive care unit" showed that the length of hospital stay for babies whose mothers provided all primary nursing care and were actively involved in caring for their babies decreased significantly.^[17] Beheshtipoor *et al.*'s results are consistent with the findings of this study.

The present study was run by COPE designed by Dr. Melnyk for preterm infants' parents, but three out of four stages were implemented in this study by considering the socioeconomic and logistic differences.

In the study by Melnyk *et al.* on 260 preterm infants' parents, after having actively participated in COPE, the parents showed less stress, anxiety, and depression. Furthermore, a 3–8 day decrease in the NICU length of stay was seen in the experimental group.^[13] These findings are quite in agreement with those of the present research.

In Karami and Rostami's study, no statistically significant difference was observed between the two groups regarding the length of hospital stay after an educational/supportive program was implemented. This quasi-experimental study was conducted on 60 mother–preterm infant pairs. Mothers in the experimental group received supportive educational program including education about and participation in taking care of the infant, following up patient's progress course, and discharge education. The findings were contrary to the findings of the present study, as the length of hospital stay was not significantly different between the groups.^[20]

One of the limitations of this study was that the mothers could have received support and information from other healthcare service centers and nurses, which could not be controlled by the researcher. The level of social and family support with demographic differences and the severity of the disease could have influenced the results. Also, due to socio-cultural factors, the researchers did not include the fathers of the infants in the study.

In order to promote family-centered care in NICU, implementing empowerment programs for mothers seems to be helpful. NICU nurses play an important role in preventing the problems of mother–infant interaction and enhancing their participation in infant care through providing appropriate information and necessary educational programs. Further study with larger sample size and post-discharge follow-up is recommended to evaluate the long-term effects of the program. A study on the effect of the program on nutrition and developmental indices is suggested.

The use of mothers' empowerment program as an effective, very low-cost, and efficient means in the form of written manuals and audio and video tapes with regard to their practical implementation in the NICUs with inadequate human resources and high workload can be highly beneficial. However, conducting studies with larger sample size and for a longer term, continued after infants' discharge, is recommended to prove the efficiency of this method.

CONCLUSION

The results of this study indicated the effect of mothers' empowerment program on weight gain in preterm infants and in reducing their hospital stay. Thus, the role of NICU staff in training mothers is of great significance as they are one of the important persons in improving the infants' health. It should be noted that the mother's role as the driving force of infant's health needs to be considered more and any modality has to be used to educate and encourage them.

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Conflicts of interest

There are no conflicts of interest.

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