Evaluation of the Effect of the Oral Motor Interventions on Reducing Hospital Stay in Preterm Infants

Nasrin Mahmoudi[1] - Khadijah Zarei Me [2], Parisa mohaghegh[3], Mahmoud Imani[4] (corresponding author) - Mahmoud Rezaeipour[5,] Azizollah, Arbabisarjou[4]

[1.] Student of master in science of nursing at neonatal intensive cares, Tehran school of nursing and midwifery, Tehran University of Medical Sciences, Tehran, Iran. Email: m_mahmoodi@razi.tums.ac.ir
[2.] Faculty member, Department of Pediatric Nursing, School of Nursing, Tehran University of Medical Sciences, Tehran, Iran. kh.zarei@razi.tums.ac.ir.
[3.] Faculty member, Associate professor, Tehran University of Medical Sciences, Hazrat Rasoul Akram Hospital, Tehran, Iran. pmohagh@yahoo.com
[4.] Faculty member[3,] Zahedan University of Medical Sciences, Zahedan, Iran. mimani2012@yahoo.com
[5.] Pediatrician, Zahedan University of Medical Sciences, Zahedan, Iran. m.rezaypoor@yahoo.com

Abstract: Low birth weight is the most important cause of mortality in infancy which occurs due to the several reasons including the birth of a preterm (premature) baby. These infants need to be in hospital due to the undeveloped respiratory and digestive systems and coordination between different systems. Long stay in the hospital can be associated with complications and high cost of treatment, therefore, treatments that reduce the duration of stay in hospital can help the patient and the healthcare system. Methodology: This study was a clinical-trial study which conducted through selecting both control and intervention groups. In this study, 20 cases (infants) were assigned to each group and intervention was performed using the PIOMI method. Results: The mean duration of stay in hospital in the both control and intervention groups were 19.4 (days) and 16.5 (days) respectively which showed a significant difference (P = 0.027). Discussion and Conclusion: Oral motor stimulation using PIOMI method is an effective help in earlier start of oral feeding, and reduction in the duration of stay in hospital. Therefore, this method can help the treatment of preterm infants and lower health care costs.
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1. Introduction

The most important determinant of neonatal and infantile mortality is the low birth weight (LBW) due to the premature birth or intrauterine growth retardation (IUGR) and giving birth to multiples (multiple pregnancies) (1). Although these infants make up a very small percentage of newborns, reduction in their mortality rate is a sign of improved medical care (2). During the past 10 years, increased survival rate in very low birth weight (VLBW) has greatly increased due to the prenatal and postpartum cares. One of the things effective on the survival of infants is paying attention to the early start of oral feeding (3).

Since the digestive, central nervous and respiratory systems of preterm infants have not developed; they should be admitted to the intensive care unit (NICU) for a few days to several months. The proper way to feed premature infants admitted to the NICU is a scene of repeated clashes for the physicians, parents and nurses (5 and 3). In 1998 the American Association for Infant Academy announced full toleration of oral feeding as one of the criteria to discharge infants from the hospital. Development and adequacy of feeding behavior are formed before the birth. Jaw movement of fetus begins from the 11th week of fetal life and swallowing and sucking practices begins from 13th week of fetal life.

With increasing gestational age, sucking and swallowing and breathing patterns will be developed more until the 34th week of fetal life. So the greater the baby's gestational age, the better sucking skills. Nutritional problems in infants who are born before 37th weeks of fetal life is very high. These problems caused by hypotonia, weakness and incoordination of movements, poor alertness, irritability, inconsistency in behavior and instability. The main barrier to oral feeding in infants with the age less than 34 weeks is the imbalance in sucking, swallowing and breathing. This kind of feeding can cause apnea, drop in pulse oximetry, transient bradycardia and aspiration.

For this reason, infants haven't reached the age of 34 weeks after fertilization are not fed by feeding bottle or breast, so that the transition time of food transfer through gavage to the mouth, in a 28-week infant may takes up twelve weeks or more. Some

studies conducted with intervention on a preterm infant's face showed that the time of transition from gavage feeding to the oral feeding is reduced. Thus oral feeding of infant starts earlier and duration of stay in hospital is reduced. Prolonged stay in hospital can be associated with the several complications which have shown in the conducted research.

The cost of 1 to 2 days stay in hospital is about $ 1,500. Duration of preterm babies stay in hospital is longer and the average cost of which is about $ 79,000. Although preterm births constitute 12% of all births (compared to the term infants), but these newborns account for the 50% of total hospital costs due to the long stay in the hospital.

As preterm infants cannot be fed by the bottle or breast due to the undeveloped mouth muscle, inconsistency between sucking, swallowing and breathing motions; they will not be discharged from hospital as long as they are orally fed and their physiological conditions are not stable during feeding and their weight gain status is not well.

These feeding problems increase the cost of stay in the hospital. More than half a million infants are hospitalized annually and about $ 2 billion is saved in the costs with the three-day reduction in hospital stay(6).

This study focuses on the impact of oral motor intervention in preterm infants on reducing the duration of stay in the NICU unit of the hospital and the aim of this study is to evaluate the impact of interventions on preterm infants at the start of oral feeding and finally the impact of this intervention on the time of hospital discharge will be examined and the research question is whether the intervention had an impact on reducing the duration of hospitalization in preterm infants with oral motor or not?

2. Material and Methods

This clinical-trial study was conducted with both test and control groups. The research population of this study was comprised of newborns with 28 to 32 week of pregnancy age who admitted to the Ali-ebne abi-Talib Hospital in Zahedan. Sample size was determined as 20 infants for each group using the sample size determination formula and 4 months were determined as the period of study (in 2012).

Samples were randomly divided into blocks and assigned to the intervention or control group. Demographic information form, vital signs record sheet and evaluation form of preterm infants' readiness for oral feeding were used as data collection tools. Demographic information questionnaire and vital signs record sheet were developed using method of content validity and approved through obtaining the viewpoints of 10 faculty members. To assess the reliability of the tool used in the country, simultaneous rating method performed by the researcher and co-researcher on 10 nominated infants was used.

There was no significant difference between the two cases (infants) in scoring. The score of this tool is between 0-38 and oral feeding started after obtaining a score higher than -30 and more. Infants with 28 to 32 weeks of gestational age, based on the first trimester sonography (ultrasound), were fed with at least 10CC/KG food by gavage. Infants with no disorder such as cleft palate, cleft lip and congenital disorder (according to the records) were enrolled. Infants with gestational age of 28-32 weeks who suffered from sepsis, heart disease, necrotizing enterocolitis, grade 3 and 4 intraventricular hemorrhage (based on the result of sonography (ultrasound) which is routinely performed in the first week), and severe asphyxia were excluded from study.

After obtaining permission from the parents, infants were enrolled. Then 40 infants were divided into both control and test groups based on sampling method. Infants were attached to the pulmonary-cardiac monitoring and pulse oximetry before, during and after intervention and their status was reviewed. Head and neck were placed in a given line and direction. Duration of infants' stay in the hospital from the time of admission until the day of discharge was calculated. For a full integration of all cases in the control and test groups, care and feeding practices were similar in both groups.

So that manner of swaddling, reducing the light of room, implantation, care in arms and mother's presence in the neonatal unit of the hospital were similar in both groups and the difference was that the control group did not receive any intervention.

The intervention practices were performed based on following order and using PIOMI method.

Irritation of the cheeks, twice for 30 seconds, stimulation of the lips, once every 30 seconds,

pursing the lips, once for 30 seconds, gums irritation, twice for 30 seconds, stimulating the lateral sides of the tongue and cheek, twice for 15 seconds, irritation of medial septum of tongue and palate twice for 30 seconds and finally non-nutritive sucking with a pacifier was performed for two minutes. After the 7th day of intervention, when the infant tolerated the quantity of gavage feeding, oral feeding protocol was performed as follows:

The quantity (volume) of the gavage feeding using syringe (Supa) was five cc. During the next days, frequency of oral feeding was increased once a day until the infant could get full oral feeding and duration of the baby stay in hospital was calculated. For data analysis, descriptive and inferential statistics in SPSS 19 software were used. Independent t-test was used to compare the duration of stay in hospital

between the two groups. Duration of stay in hospital showed no significant difference between the two groups (p = 0.027) and intervention group had less duration of stay in hospital.

Results: Based on the results, mean gestational age was calculated as 30.6 and 30.55 weeks, respectively in the intervention and control groups. The mean weights were 1427 g and 1548 g, respectively, in each group. Independent t-tests were used to control these interfering factors. The mean weight (p = 0.39) and gestational age (p = 0.9) were not significantly different between the two groups.

In the intervention group, the massage was performed using PIOMI technique and if they got the required score based on the oral feeding readiness form, they were gradually fed through the mouth. The oral feeding time and full mouth oral feeding time were measured for the both groups. The intervention group received their first oral feeding earlier and the oral feeding time was faster for them. Independent t-test was used for the evaluation of the mean duration of stay in hospital between the two groups and the significant difference was P = 0.027. Mean duration of stay in hospital were 16.5 and 19.4 days respectively for the control and intervention groups and showed that the duration of stay is less in the intervention group. (Table 1)

Table 1. The mean duration of stay in hospital between the two under study groups

Variable	Group/ statistics	Mean	Standard deviation	Number	Maximum	Minimum	Frequency	T	Df	P value
Duration of stay in Hospital	Control	19.4	4.08	20	14	27	13	2.29	38	0.027
	Intervention	16.50	3.91	20	11	25	14			

Independent t-test was used to compare the two groups in understudy variables.

Results showed no significant difference in duration of hospital stay between the two groups (p = 0.027) and the intervention group had less duration of stay in hospital.

Discussion: Duration of stay in hospital is one of the most effective indicators in the improvement of patients. With prolonged hospital stay, the possibility of infection and complications are greater in addition to the more cost for the patient and the healthcare system. Therefore, searching for the suitable solutions in order to reduce the duration of stay in hospital can be an effective help for patients and the health system to reduce the complications and costs. Preterm infants need help to develop and appropriately operate these systems due to the swallowing problems which are resulted from undeveloped digestive and respiratory systems.

One of the appropriate solutions is the use of oral stimulation in these infants. In this study, PIOMI technique was used for the oral stimulation. The results showed that the oral feeding starts earlier, then duration of stay in hospital which is one of the criteria for hospital discharge, is reduced. The results of this research was consistent with the results of 2011Lesson study during which the PIOMI intervention was performed on the infants.

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Corresponding Author:
Dr. Mahmou Imani
Department Pediatrics & Neonatology
Zahedan University of Medical Sciences, Zahedan
9816743463, IRAN.
E-mail: mimani2012@yahoo.com

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