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The Effect of an Educational and Supportive Relactation Program on Weight Gain of Preterm Infants

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ABSTRACT

Introduction: Re-establishing breastfeeding (relactation) is necessary in preterm infants who are deprived of breastfeeding due to hospitalized in the neonatal intensive care unit (NICU). Although NICU nurses train mothers about breastfeeding and relactation to some degree, there exists a lack of support or evaluation for restarting breastfeeding. The present study tried to determine the effects of an educational and supportive relactation program on weight gain of preterm infants. ***Methods:*** This clinical trial study was performed on 60 preterm infants with mean gestational age of 29 weeks hospitalized in NICU of Alzahra Hospital (Tabriz, Iran). The infants were evaluated in two groups of 30. The mothers of infants in the control group received routine training and support about relactation while the intervention group received routine training as well as the designed educational and supportive relactation program including breast pumping, increasing milk agents and kangaroo mother care. Daily follow-up was conducted by the researcher. All the infants were weighed by a co-researcher. ***Results:*** On the 14th day of the study, the mean (SD) weight of infants in the control and intervention groups was 1666.67 (136.08) and 1765.86 (156.96) g, respectively. ***Conclusion:*** Providing mothers with support from the medical team and training on relactation and kangaroo mother care can lead to better weight gain of the low birth weight premature infants.

Introduction

According to the World Health Organization (WHO), low birth weight is defined as < 2500 g either because of premature birth (gestational age < 37 weeks) or small for gestational age. In other words, growth curves of low birth weight infants are below the 10th percentile for weight.[1] Moreover, very low birth weight and extremely low birth weight infants have birth weight of less than 1500 g and 1000 g, respectively.[1] According to the latest statistics released by the WHO in 2010, more than one out of 10 infants worldwide and 12.9% of Iranian infants are born prematurely.[2]

Preterm birth is a major cause of death and a significant cause of long-term loss of human potential amongst survivors all around the world. Complications of preterm birth are the single largest direct cause of neonatal deaths responsible for 35% of the world's 3.1 million annual deaths a year. They are also the second most common cause of death among under-five year-old children after pneumonia.[2]

The best choice for feeding preterm infants is breastfeeding or expressed mother's milk. There is strong and consistent evidence that

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feeding preterm infants of any gestational age by their own mothers' milk is associated with a lower incidence of infections and necrotizing enterocolitis compared to feeding with formula.[1] However, breastfeeding immediately after birth may be delayed due to hospitalization of infants in neonatal intensive care units (NICU). On the other hand, some mothers are recommended not to breastfeed their infants. When infants are very preterm or too ill to tolerate oral intake, breastfeeding cannot be successful.[3] Thus, it is for mothers of infants in the NICU to induce relactation.

Relactation is re-establishing breastfeeding after stopping or after a specified period of very little breastfeeding. It should develop as a part of baby-friendly hospital strategy.[4] Some studies suggest better weight gain with kangaroo care.[5] Postnatal growth restriction has been shown to be associated with a long-term risk of poor neuro-sensory development.[6]

The decreasing trend of exclusive breastfeeding in the first four and six months after birth in Iran significantly differs from the trends in the countries of the region. Therefore, encouraging and supporting Iranian mothers seem necessary.[7] Iranian nurses provide mothers with sporadic relactation-related education and support without any written protocol. Considering the increased number of premature infants, employing coherent and continuous interventions is essential in order to help mothers restart the breastfeeding process. Although NICU nurses advise mothers to relactate and breastfeed their low-weight preterm infants, there is no support for mothers with feeding failure and these cares are generally scarce and not validated. A mother who is planning to relactate needs encouragement, support, and proper education. Previous studies about relactation have been conducted in other countries with different cultures. Since the success of relactation might be influenced by the culture of a country, the purpose of this study was to compare the impact of a 14-day relactation program with training, supporting, and advising correct breast pumping, increased consumption of milk agent, and KMC with traditional care.

Materials and methods

This clinical trial study was per- formed in the NICU of Alzahra Hospital (Tabriz, Iran) from Apr 21 to November 5, 2011. The comparison of ratio formula was used to determine the sample size. The rate of exclusive breastfeeding in infants younger than six months old is 23% according to the United Nations Children's Fund's last records ($p1 = 23\%$).[8] Literature review revealed that the rate of success in relactation is 75% ($p2 = 75\%$).[9, 10, 11] Thus, considering $\alpha = 5\%$ and $\beta = 20\%$, the rate of success of the program is 20% of the sample in each group. Therefore, each group needs 26 subjects which was increased to 30 considering the probability of los. Hence, 60 premature low birth weight infants with the mean gestational age of 29 weeks who had been admitted to the NICU were studied in two groups of 30 (control and intervention). Simple non-random sampling was used to allocate the infants based on the accessibility of mothers. All mothers of singleton preterm infants under two months of age who had decreased or discontinued breastfeeding for 7-28 days and used formula as more than half of their baby's daily feeding were included in this study. All infants were fed through nas-ogastric/orogastric tube (OGT/NGT) due to their low weight and inability to suck breasts properly.

The selected mothers were physically and mentally stable, preferred to breastfeed their infants and provide KMC, and had no physical problems such as abscess, systematic diseases, mastitis, or inverted nipples which could interfere with breastfeeding. The infants had no congenital malformation, neurological

cardiovascular problems, congenital hereditary diseases, or birth injuries.

The mothers were well informed and their consent was obtained. In order to determine the reduction in the amount of milk, the mothers were asked to pump each breast for at least 15 minutes using an electronic pump (Medela, Switzerland) and the amount of milk was recorded. After a medical examination, the mothers were prescribed with three daily tablets of metoclopramide 10 mg and Shirafza tablets. Shirafza tablets are produced by Goldaru Pharmaceutical Company (Iran) and contain fennel (Foeniculum vulgare),[6] cumin seed (Cuminum cyminum),[7] fenugreek (Trigonella foenum-graecum),[8] and dill (Anethum graveolens).[9] The ratios of components are 50%, 20%, 20%, and 10%, respectively. All possible side effects of medications were explained to the participants and they were asked to contact their doctor in case of any problems.

The control group was provided with the routine relactation-related trainings by nurses. They were hence recommended to take the required medicine and taught how to breast pump correctly and to perform KMC. The trainings were sporadic, short, and without enough follow-up. The intervention group received not only the mentioned routine trainings, but also supportive training about relactation in an organized procedure which included recommendations on consistent taking of the prescribed pills, consuming more liquid and protein-rich foods, pumping each breast for 15-20 minutes every two to three hours, and performing KMC twice a day for at least 60 minutes. The mothers in the control group also received daily support and encouragements from the researcher. In order to create an appropriate training environment, the trainings took place in the breast feeding room of the ward and in the afternoon when the ward was quiet and the mothers were more prepared. Moreover, the nursing support, i.e. giving the necessary information about relactation to the mothers, was provided by a trained researcher. The first day, the training took one to two hours and the researcher supported and encouraged the mothers when they performed the steps accurately. The mothers were then directly and individually consulted. A co-researcher blind to the grouping measured and recorded the frequency of breastfeeding and feeding with formula, information about KMC, and daily weight in a specific form.

The infants were weighed using an electronic Seca infant scale (made in Germany). The device was calibrated daily before and after the measurements. Infants were weighed by the co-researcher in the morning, after changing the infants' diapers, and before they were fed.

At the end of the study, data of 60 mother-infant pairs was collected and analyzed using SPSS for Windows 13.0 (SPSS Inc., Chicago, IL, USA). The quantitative and qualitative variables were reported as mean (standard deviation) and frequency (percentage), respectively. P values less than 0.05 were considered significant. Analysis of variance and Student's independent t-test were used to analyze the results. Content validity of the data collection form was determined by receiving comments from 10 pediatric nurses and pediatricians. In order to determine the reliability of the form, 10 cases were observed by two observers separately. The inter-rater reliability coefficients ranged between 0.87 and 1.00 which were acceptable.

Results

This study included preterm infants and their mothers. At the beginning of the study, the age of infants in the control and intervention groups was 15-39 and 15-42 days, respectively. One infant in the control group (3.3%) and two infants in the intervention group (6.7%) had extremely low birth weight. There were 20 (67.0%) and 25 (83.3%) very low birth weight infants in the control and intervention groups, respectively. The birth weights of the

infants in the control and intervention groups were 980-1650 and 880-1670 g, respectively. On the first day of the study, the mean (standard deviation) of birth weight was 1357.50 (103.84) g in the control group and 1404.33 (144.11) g in the intervention group (p = 0.15). The infants' weight ranged between 1100 and 1495 g in the control group and between 1100 and 1710 g in the intervention group (three infants weighed more than 1500 g). Table 1 shows some characteristics of the infants and their mothers. The two groups were similar regarding gestational age, birth weight, gender and age of infants, mothers' education level and occupation status and also the methods of delivery (p > 0.05).

Comparison of the mean frequency of daily breast milk feeding on the second day showed a significant difference between the two groups. In both groups, the frequency of daily breast milk feeding on the first day was 0-5 times. On the 14th day, however, the frequency was 1-7 times in the control group and 5-12 times in the intervention group (Table 2).

The overall frequency of KMC in both groups was 0-2 times/day. Nevertheless, from the third day, the mean frequency of daily KMC in the intervention group was significantly higher than in the control group (Table 3).

Similarly, comparing the mean daily weight of infants showed an increasing trend during the 14 days of follow-up in both groups. The difference between the two groups was significant from the 10th day. On the 14th day, the mean (standard deviation) weight of infants in the control and intervention groups was 1673.00 (131.28) and 1765.86 (156.96) g, respectively (p = 0.01). The mean (standard deviation) of weight gain during the 14 days of the study was 315.50 (58.66) g in the control group and 356.55 (69.40) g in the intervention group (p = 0.01) (Table 4).

Table 1. Demographic characteristics of the infants and their mothers in the intervention and control groups

Characteristics	Intervention group (n = 30)	Control group (n = 30)	Statistical Indicators t	df	p
Sex*					
Female	11 (36.70)	16 (53.30)	χ^2=1.68	1	0.19
Male	19 (63.30)	14 (46.70)			
Birth order*					
1st	17 (56.66)	15 (50.00)	χ^2=0.27	1	0.60
2nd	13 (43.33)	15 (50.00)			
Gestational age (weeks)†	29.66 (1.64)	29.23 (1.61)	t=-1.03	58	0.30
Birth weight (g)†	1545.67 (1382.91)	1365.67 (173.71)	t=-0.70	58	0.48
Age at the beginning of the study (days)†	22.93 (8.19)	22.80 (6.84)	t=-0.07	58	0.94
Type of delivery*					
Normal vaginal delivery	25 (83.30)	28 (93.30)	χ^2=1.45	1	0.23
Cesarean section	5 (16.70)	2 (6.70)			
Mother's age (years)†	28.56 (5.56)	28.93 (5.29)	t=0.27	58	0.78
Duration of discontinued or decreased lactation†	12.56 (5.56)	11.67 (4.93)	t=-0.66	58	0.51
Mother's occupation*					
Employed	5 (16.70)	2 (6.70)	χ^2=3.17	2	0.20
Housewife	25 (83.30)	28 (93.30)			
Mother's education*					
Illiterate	3 (10.00)	1 (3.33)			
< High school diploma	11 (36.70)	10 (33.33)	χ^2=1.75	3	0.62
≥ High school diploma	16 (53.30)	19 (63.33)			

* N (%),† Mean (SD)

Table 2. The mean frequency of breast milk feeding in the intervention and control groups

Day	Intervention group (n = 30)	Control group (n = 30)	Statistical Indicators		
			t	df	p
1st	2.63 (1.40)	2.50 (1.30)	-0.37	58	0.71
2nd	3.67 (1.40)	2.77 (1.22)	-2.60	58	0.01
3rd	4.20 (1.60)	2.93 (1.43)	-3.19	58	0.002
4th	4.97 (1.50)	2.87 (1.48)	-5.34	58	< 0.001
5th	5.83 (1.80)	3.00 (1.51)	-6.68	58	< 0.001
6th	6.37 (1.80)	2.93 (1.55)	-7.93	58	< 0.001
7th	6.93 (1.60)	3.00 (1.36)	-10.18	58	< 0.001
8th	7.20 (1.20)	2.83 (1.46)	-12.34	58	< 0.001
9th	7.60 (1.50)	3.10 (1.62)	-11.15	58	< 0.001
10th	8.07 (1.40)	3.00 (1.66)	-12.54	58	< 0.001
11th	8.47 (1.40)	3.10 (1.90)	-12.35	58	< 0.001
12th	8.79 (1.60)	3.03 (1.71)	-13.46	58	< 0.001
13th	9.14 (1.70)	3.27 (1.68)	-13.46	58	< 0.001
14th	9.24 (1.80)	3.43 (1.92)	-12.01	58	< 0.001

Values are expressed as mean (SD)

Table 3. The mean frequency of daily kangaroo mother care in the intervention and control groups

Day	Intervention group (n = 30)	Control group (n = 30)	Statistical Indicators		
			t	df	p
1st	1.40 (0.50)	1.50 (0.51)	0.78	58	0.44
2nd	1.73 (0.40)	1.50 (0.57)	-1.75	58	0.08
3rd	1.87 (0.30)	1.47 (0.57)	-3.27	58	0.002
4th	1.87 (0.30)	1.43 (0.62)	-3.32	58	0.002
5th	1.80 (0.40)	1.33 (0.54)	-3.75	58	< 0.001
6th	1.80 (0.40)	1.43 (0.50)	-3.10	58	0.003
7th	1.83 (0.40)	1.33 (0.60)	-3.83	58	< 0.001
8th	1.80 (0.50)	1.47 (0.50)	-2.60	58	0.01
9th	1.80 (0.50)	1.50 (0.51)	-2.34	58	0.02
10th	1.83 (0.40)	1.47 (0.50)	-3.17	58	0.002
11th	1.80 (0.40)	1.53 (0.50)	-2.24	58	0.03
12th	1.83 (0.40)	1.43 (0.50)	-3.37	58	0.001
13th	1.79 (0.40)	1.47 (0.50)	-2.70	58	0.009
14th	1.79 (0.40)	1.50 (0.51)	-2.42	58	0.01

Values are expressed as mean (SD)

Table 4. The mean daily weights (g) of infants in the intervention and control groups

Day	Intervention group (n = 30)	Control group (n = 30)	Statistical indicators		
			t	df	p
1st	1404.33 (144.00)	1357.50 (103.84)	-1.44	58	0.15
2nd	1422.67 (151.00)	1378.67 (113.03)	-1.28	58	0.20
3rd	1445.33 (150.00)	1395.67 (116.10)	-1.42	58	0.16
4th	1467.67 (150.00)	1420.67 (118.58)	-1.35	58	0.18
5th	1489.67 (153.00)	1441.00 (118.47)	-1.37	58	0.17
6th	1520.33 (156.00)	1464.67 (119.82)	-1.55	58	0.12
7th	1551.67 (153.00)	1492.00 (120.38)	-1.68	58	0.09
8th	1576.33 (152.00)	1518.33 (119.31)	-1.64	58	0.10
9th	1603.67 (153.00)	1539.67 (116.54)	-1.82	58	0.07
10th	1638.00 (157.00)	1562.17 (122.98)	-2.08	58	0.04
11th	1669.33 (154.00)	1588.00 (125.68)	-2.24	58	0.03
12th	1705.52 (152.00)	1616.00 (131.69)	-2.42	57	0.01
13th	1733.79 (155.00)	1642.33 (135.56)	-2.41	57	0.01
14th	1765.86 (156.96)	1673.00 (131.28)	-2.47	57	0.01

Values are expressed as mean (SD)

Discussion

Breastfeeding and KMC were more frequently performed in the intervention group than in the control group. Moreover, infants in the intervention group gained more weight compared to the control group. It can thus be concluded that increased frequency of breastfeeding will result in greater weight gain in preterm infants than formula feeding will do.

The findings of our research are consistent with a prospective study by Montjaux-Regis et al. in which 55 preterm infants in NICU under 32 weeks old were surveyed for two six-month periods from 2003 to 2005. Their mean gestational age and mean weight were 28.6 weeks and 1105 g, respectively. Infants who were breastfed by their own mothers were compared with those who were breastfed by other women. The results indicated that weight gain in the first group was much higher than in the latter group. There was in fact a positive relationship between the infants' weight gain and the intake of their own mothers' breast milk.[12]

Similarly, Alam et al. assessed the effects of relactation on infants (less than four months old) with diarrhea. They found 50% of one-month old infants and 80% of three-month old infants to have a 10% increase in weight-for-height.[13] Lakhkar et al. performed a study on 20 infants (age: one month to one year old) who had not been lactated for a 2-16 weeks. Their weight gain was controlled once a month for three months. Lactated infants had normal weight gain and normal growth curves with shortened period of illness.[4] These findings are also in line with the results of the present study and very similar to the results of studies carried out by De et al.[10] and Chaturvedi.[11]

Gathwala et al. compared the effects of KMC and standard care (open care system or incubator) on infants' weight gain and mothers' breastfeeding. KMC was performed for at least 6 hours per day. After three months of follow-up, the mean weight gain in infants of the intervention group was higher than the control group. Moreover, exclusive breastfeeding rates were 88% and 72% in the intervention and control groups, respectively.[14] According to these results, KMC would improve physical growth and breastfeeding in low birth weight infants. Almeida et al. evaluated the impact of KMC on exclusive breastfeeding in low birth weight infants. They found the exclusive breastfeeding rate (until the age of six months) in KMC group to be higher than that of the control group.[15]

Although the results of our study about the effects of KMC on infants' weight gain are in line with the two studies performed by Gathwala et al.[14] and Almida et al.,[15] the difference in weight gain of infants in the two studied groups might have been due to the increased frequency of breastfeeding, increased mother-infant bonding, and regular KMC. However, based on the results obtained during the 14-day follow-up period in the present study, it can be concluded that during long-term follow-up, increased frequency of breastfeeding and KMC may lead to upward growth curve.

Seema et al. assessed 50 mothers with hospitalized infants under four months of age who were fully or relatively deprived of breastfeeding. The subjects were randomly assigned to two groups in which 86% had full breastfeeding inadequacy and 14% had relative inadequacy. Both groups received support and encouragement for continuous sucking of infants. The second group received metoclopramide as well. Similar to our findings, their results indicated that relactation is likely to occur in most mothers without increasing milk agent.[16] Nevertheless, there is a dire need of not only a professional and supportive expert to overcome the primary problems during relactation, but also education and motivating mothers for exclusive breastfeeding during the first four to six months.

This study had some limitations. For instance, the number of infants who received

breast milk supplements was not determined. Therefore, more studies to evaluate weight gain of infants receiving milk supplements are recommended. It is also suggested to perform long-term follow-up observations and weight monitoring in preterm infants. Besides daily weight measurements, other physical growth criteria such as head circumference, height, and growth status can be investigated. Moreover, since KMC, increased frequency of breastfeeding, and increased milk agents were used simultaneously during the 14-day follow-up in our study, comparing and specifying the effects of each of these factors on increasing the weight gain of infants are recommended in future studies.

Conclusion

Our intervention had a positive impact on daily weight of infants. Therefore, attempts should be made to re-establish breastfeeding at every opportunity and in any situation. Mothers' motivation and confidence have key roles in a successful relactation. Receiving enough protection from the nurses and sanitary team is important for relactation and feeding of premature infants. The presence of a specialist nurse in the NICU is hence essential for protection, offering regular educations, and daily follow-ups.

Ethical issues

None to be declared.

Conflict of interest

The authors declare no conflict of interest in this study.

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