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Original Article

The Effects of Education Program Applied to the Families of Moderate and Late Premature Infants on Breastfeeding, Parental-infant Attachment and Parents' Anxiety Levels in the First Year: A Randomised Controlled Trial

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Abstract ***Introduction:*** To evaluate the effect of education given by home visiting on the families of moderate/late premature infants (MLPI) in respect of exclusively breastfeeding (EBF), complementary feeding and parent-infant interaction up to 1-year. ***Method:*** MLPI were randomly separated into three groups (n=22) as Standard Care (SCG), Mothers Education (MEG) and Family Education Group (FEG). Four home visits were made to MEG/FEG. They were evaluated at 1-week after discharge and 1/2/3/4/6/9/12 months. Infant-Character-Perception-Scale, Maternal-Attachment-Inventory, Paternal-Postnatal-Attachment-Questionnaire, State-Anxiety-Inventory were used. ***Results:*** EBF was higher in MEG/FEG than SCG at 3th (respectively 72.7%, 59.1%, 27.3%, p=0.01, OR:7.11; 95% CI; 1.89-26.80 and OR:3.85; 1.01-13.66), 4th (72.7%, 54.5%, 13.6%, p<0.001, OR:16.89; 3.63-78.56 and OR:7.6; 1.73-33.34) and 6th month (68.2%, 54.5%, 27.3%, p=0.02, OR:13.57; 2.99-61.59 and OR:6.3; 1.45-27.73). At 12 months, breastfeeding cessation was higher in SCG (50%) than MEG (18.2%) and FEG (22.7%) (p=0.04). Mothers' baby perception, mother/father-infant attachment were better in MEG/FEG. ***Conclusion:*** Education program can improve EBF and parent-infant interaction in MLPI.

Key words *Breastfeeding; Parents; Premature infants*

Introduction

Moderate and late premature infants (MLPI-gestational week $32^{0/7}$-$36^{6/7}$) constitute 84% of the premature. MLPI has worse breastfeeding results compared to term babies due to low rates of exclusively breastfeeding (EBF) and breastfeeding rates, early cessation, breastfeeding difficulties, feeding problems, and frequent hospitalisations.[1,2] On the other hand, increased stress and anxiety levels in MLPI parents decreased social interaction with their babies, which cause the development of an unsafe attachment model and increased risk of insensitive parenting. It is recommended that MLPI families receive extra support at the hospital and after discharge, both for successful and long-term breastfeeding of these babies, as well as for parents to interact appropriately with a healthy mood.[3] The most effective intervention for this is the education given to the families.[4-6]

The majority of studies on breastfeeding have focused on the mother-infant couple. Whereas fathers are often overlooked, they are in the ideal position to help their breastfeeding partners. In many studies, it has been reported that the father's attitudes and approaches towards breast milk have a positive effect on the mother's desire to

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breastfeed, the beginning and duration of breastfeeding, and the EBF rate.[7-9] However, these studies were conducted on term babies and their families, the effect of attitudes and approaches towards breast milk, especially of fathers with MLPI, on breastfeeding results is not clear. At the same time, there are a limited number of studies investigating the effects of both parents' training on baby care on the MLPI and their family.

Aim and Objectives

Our aim in this study is to evaluate the effect of the educational intervention created by the researchers and carried out with home visits on the EBF, breastfeeding status of MLPI and the anxiety levels of the parents and the parent-infant relationship. In order to evaluate the efficiency of fathers, the intervention groups were designed as two different groups in which only mothers participated and mothers and fathers participated together.

The education program aimed to provide emotional and social support to the families based on two main components; 1) to improve the EBF and breastfeeding of MLPI, 2) to ensure that parents with MLPI gain more knowledge and become more sensitive parents.

Primary Objective

To measure the effectiveness of each of two education interventions designed to increase the EBF rate and duration of breastfeeding in MLPI up to 1 year corrected age (CA).

Secondary Objective

To investigate the effectiveness of the interventions on the parents of MLPI in respect of mothers' baby perception, parents' anxiety levels, and parent-infant attachment.

Study Hypotheses

The hypotheses of this study are as follows; with the education program provided;

H1: the duration of breastfeeding and EBF rates would be significantly higher difference in the intervention groups compared control group at first 1 year CA.

H2: the rate of positive perception of the infant by the mother, mother-infant attachment, father-infant attachment and the state-anxiety levels of the parents would be significantly difference between the interventions and control groups at first 1 year CA.

Methods

Design and Setting

This study was conducted as a randomised controlled trial with a 1-year follow-up in an university hospital between June 2015 and July 2017. Approval was obtained from the local ethics committee for the study (no: 2015-05/07, date: 15/05/2015). Approximately 1500 babies are born per year in our hospital. The level 3 Neonatal Intensive Care Unit (NICU) provides hospitalisation of about 800 babies from this city and surrounding cities per year. This study included the parents and infants who were born within the 32-37 weeks with a birth weight appropriate to gestational age and were followed up in the NICU. The data were collected from the parents of MLPI while the infant was during in the NICU, at one week after discharge than at 1, 2, 3, 4, 6, 9 and 12 months CA. The CA was calculated by subtracting the time of premature birth from the chronological age.[10]

Participants

In the NICU, suitable MLPI and their parents were determined for the study. Any infants with congenital anomalies, neurological sequelae or chromosome anomaly, those with birthweight <10 percentile or >90 percentile according to gestational week, and multiple births were excluded from the study. Parents with psychiatric or chronic disease, mothers with postpartum depression, those living outside the centre of the province, who were not willing to participate or parents who were living separately, were excluded, together with their infant. Any infants diagnosed with a chronic disease during the follow-up were withdrawn from the study, together with the parents. Written and verbal informed consent was obtained from the parents who agreed to participate.

Randomisation and Sample

After informed consent procedures were completed, the baseline data related to the birth of the infant and follow-up in the NICU were retrieved from hospital records. The parents provided sociodemographic information. The parents were randomly assigned to either a control group or two intervention groups by sequentially numbered, sealed, opaque envelopes containing randomly generated numbers. These envelopes were coordinated by a research assistant who was not involved in any other trial procedure. The groups in the study are formed as follows:

1. Standard Care Group (SCG) (control group); infants and families received routine follow-up in the Paediatric Polyclinic.
2. Mothers Education Group (MEG); the education program applied during follow-up was delivered to the mothers only.
3. Family Education Group (FEG); the education program applied during follow-up was delivered to the mothers and fathers.

Participants and researchers were not be blinded to study groups because of the true nature of this study. However, the study statistician analysed the data independently and hence was be blinded to the allocation of participants to groups.

Intervention

Before the hospital discharge, face-to-face informative briefing about the characteristics and care of premature infants and breastfeeding was given by a paediatrician, and a paediatric nurse in a calm environment to the SCG, to the mothers in the MEG and both the mothers and fathers in the FEG. A written brochure related to premature infant care was given to the MEG and FEG parents on discharge, and they were given the attending paediatrician's telephone number.

The education program was applied in a 2-hour home visit by the same paediatrician and paediatric nurse at one week after discharge than at 1, 2, and 3 months CA of the infant. In the home visit, information was given about the general health of the infant, breastfeeding, feeding, and the parent-infant relationship. Breastfeeding mothers were observed while feeding, as well as parent-infant communication. Solutions to the problems experienced or observed during breastfeeding were investigated. During the home visits, questions of the mothers in MEG and mothers and fathers in FEG were answered. In the period up to 3 months CA, in the weeks where no home visit was made, the mothers in the MEG and FEG were contacted via phone calls, and information was obtained. The subject headings and details of the education program are shown in Table 1. The same paediatrician made the follow-up of the SCG participants at the same time intervals in the Paediatric Polyclinic.

Data Collection Instruments and Procedures

Information was obtained from the mother about the nutritional status of the baby (EBF, breastfeeding, formula or complementary foods), feeding method and nutritional problems at all times during follow-up. The breastfeeding and EBF status and transition time to complementary feeding up to 1-year CA of all infants were recorded. EBF was defined by the World Health Organization (WHO) as infants receiving no food or drink (including water) other than breast milk but includes the use of vitamins, minerals, or medication.[11] Whether the time of starting complementary feeding for premature infants should be according to chronological age or CA is a matter of debate.[12] In this study, the appropriate time of starting complementary feeding was accepted as 6 months CA.

Anthropometric measurements of all the infants in the study were performed during systemic examinations at one week after discharge than at 1, 2, 3, 4, 6, 9 and 12 months CA. The physical and neurological development of the infant was interpreted according to CA. All the follow-up examinations of the infants in the SCG, and the follow-up examinations after the home visits for those in MEG and FEG, were performed in the Paediatric Polyclinic.

The parents were evaluated regarding the levels of anxiety, how the mother perceives the infant, mother-infant, and father-infant attachment. The questionnaires for the mother and father were filled at the appropriate time in the polyclinic or during home visits. The flowchart of the study is shown in Figure 1.

The Maternal Attachment Inventory (MAI)

It is used to evaluate the mother's emotions and behaviour towards her baby in the postnatal period.[13] It is a 26 item; 4 point Likert-type scale whose items range from 'always' to 'never.' The high points indicate high maternal-infant attachment (min: 26, max: 104). The Turkish validity and reliability scale was found suitable for Turkish mothers with babies between 1 to 4 months.[14] In our study, MAI was administered to all mothers at 1, 2, 3 and 4 months CA.

The Paternal Postnatal Attachment Questionnaire (PPAQ)

This scale of 19 items was developed to evaluate father-infant attachment.[15] The scale has three sub-dimensions of "patience and tolerance," "pleasure in interaction," and "love and pride." Each item is scored from 1 to 5, and high points indicate a high level of attachment. The validity and reliability of the Turkish version were studied and found to be suitable for fathers with babies between 6-12 months.[16] In our study, PPAQ was completed by all fathers at 6 and 12 months, CA.

Table 1 Timetable content of education program

Parent Education	Subjects
Before discharge	
General information	Preterm infants' features, feeding, breastfeeding techniques, body heat, dressing, sleeping, bathing, bottom cleaning, routine follow-up, vaccination, awareness of disease markers
Home visits	
General	Getting general information about mother and baby (1-4). Describing the CA, telling that the growth/development of preterm babies will be followed by CA (1,2)
Feeding	
General	Questioning of babies nutrition (frequency, breast milk or formula, feeding method, feeding problems, baby's hunger/satiety signals, signs of adequate nutrition) (1-4)
Breastfeeding	Synthesis and secretion of breast milk (1) Content of human milk, first and last milk (1,2) Relationship between breastfeeding and milk release (1,2) Frequency of breastfeeding, the effect of night breastfeeding (1,2) Importance and benefits of breast milk for babies and mothers (1-4) Importance of exclusively breastfeeding for first 6 months (1-4) Breastfeeding techniques and positions (1-2) Breastfeeding problems and breast care (1-2) Breeding and storage of breast milk (1-4) Perception of mother's own milk (1-4) Effect of fathers on breast milk (1-2) Observation and evaluation of breastfeeding (1-4)
For suckling mothers	Proper nutrition, abundant fluid intake, rest/relaxation, adequate sleep, focus on baby, request support from husband and relatives, participate in social environment (1-4)
Complementary feeding	When and how to get started (3,4) Effects of early or late start (3,4)
Possible problems	Infantile colic and solutions (1-4) Crying reasons and solutions (1-4) Try to understand the baby's clues (1-4) Vomiting and gastroesophageal reflux (1-3)
Cognitive and motor development	Age-appropriate development steps (1-4) Importance of eye contact-verbal communication with the baby (1-4) Baby calming methods (1,2) Sensitive parenting (1-4)
Parent infant relationship	The importance of a healthy parent-infant relationship (1-4) How fathers can support mother and babies (1-4)
Baby's physical examination	Systemic physical examination, anthropometric measurements (1-4) Marking in percentile curve according to CA (1-4) Processing in baby follow-up form (1-4) Informing the family about growth and development of baby (1-4).
Answering the questions of the mother (also the father in the Family Education Group)(1-4)	
Filling in forms for study (1-4)	
Determine the next visit time and terminate the session (1-4)	

CA, corrected age; 1, one week after discharge; 2, 1st month CA; 3, 2nd months CA; 4, 3rd months CA

Infant Character Perception Scale (ICPS)

It was designed to evaluate the perceptions of mothers about their infant's character, based on social attitude principles.[17] The mother is instructed to indicate the most appropriate responses according to the character of their infant in areas defined as easy - difficult, happy - unhappy, peaceful - disgruntled, cries a little - cries a lot, attentive - inattentive, active - passive, easy to look after - difficult to look after. Low points were indicating a positive perception, and high points were indicating a negative perception (min: 7, max: 49). All the mothers in the study completed this scale at one week after discharge, and at 1, 3, 6 and 12 months CA.

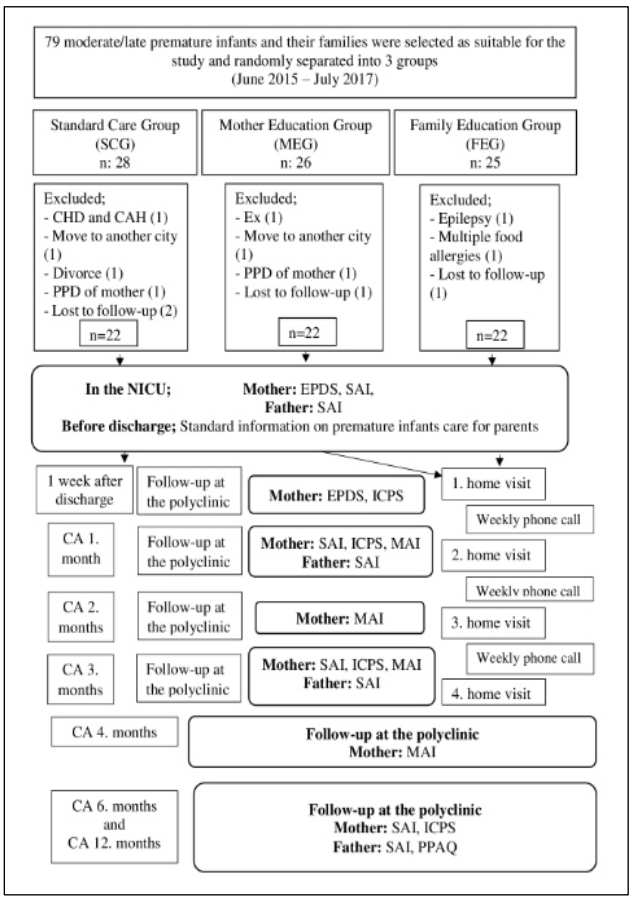

Figure 1 Flow diagram of the study.

Note: CHD, congenital heart disease; CAH, congenital adrenal hyperplasia; PPD, postpartum depression; NICU, neonatal intensive care unit; EPDS, The Edinburgh Postnatal Depression Scale; SAI, State Anxiety Inventory; ICPS, Infant Character Perception Scale; CA, corrected age; MAI, Maternal Attachment Inventory; PPAQ, Paternal Postnatal Attachment Questionnaire

The Edinburgh Postnatal Depression Scale (EPDS)

This scale was developed to determine the risk of postnatal depression, and it was adapted to Turkish.[18,19] The scale was applied to all the mothers while the infant was in NICU and at one week after discharge. Mothers with a score of >12 points were withdrawn from the study and referred to the Psychiatry Clinic.

State Anxiety Inventory (SAI)

It was used to assess the level of state-anxiety and how parents feel at a given time.[20] It is a 20-item scale adapted to Turkish.[21] The total score is between 20-80, and the high score indicates a high level of anxiety. SAI was administered to all parents when their infants were in NICU and at 1, 3, 6 and 12 months CA.

Outcomes

For the MLPI and their parents;

Primary Outcomes

- Duration of breastfeeding
- EBF rate
- Age of introduction of complementary foods

Secondary Outcomes

- Perception of the infant by the mother
- Mother-infant attachment
- Father-infant attachment
- State-anxiety levels of the parents

Statistical Considerations

According to the repeated ANOVA test, with p=0.05 and power value=0.80, by evaluating previous similar studies, by predicting standard deviation=6.0 and by foreseeing after the education program a minimum of 5 units increase in The Maternal Attachment Inventory scores, it was determined that each group should consist of at least 22 infants and their families. The potential exclusion/withdrawal rate is considered 20%.

Data obtained in the study were analysed statistically by using SPSS version 17.0 software. Baseline data were summarised with descriptive statistics. Chi-square tests were used to compare between-group differences, and the ANOVA test was applied for parametric analysis. A value of $p<0.05$ was accepted as statistically significant.

Results

The study initially enrolled 79 MLPI and their families and was completed with 66 MLPI and the parents (Figure 1). The gestational age, birth weights, APGAR scores, and follow-up characteristics in the NICU of infants were similar in all three groups. There was no significant difference between the sociodemographic characteristics of the parents in the groups (Table 2).

The mothers' time to decide breastfeeding and previous breastfeeding experiences were similar in all three groups (p=0.094). However, the rate of mothers who intend to breastfeed their babies for at least two years was significantly higher in MEG and FEG than SCG (p=0.014) (Table 3).

There was no significant difference between the groups in terms of EBF rates at the time of discharge, at one week after discharge, and at 1-month CA (p=0.242, p=0.242 and p=0.126, respectively). EBF rates were significantly higher in MEG and FEG than SCG at 3 months (respectively 72.7%, 59.1% and 27.3%, p=0.008), at 4 months (respectively 72.7%, 54.5%, 13.6%, p<0.001) and at 6 months (respectively 68.2%, 54.5% and 27.3%, p=0.022). According to the results of this study; compared

Table 2 Neonatal and parental sociodemographic characteristics

Characteristics	Standard Care Group (n=22)	Mother Education Group (n=22)	Family Education Group (n=22)	p value
Neonatal Characteristics				
Gestational age (week)*	33.9±1.3	34.1±1.1	34.1±1.5	0.869
Birth weight (grams)*	2050.2±466.6	2086.8±485.9	2086.1±398.5	0.955
APGAR, 1. minute*	6.6±1.4	6.9±0.9	6.6±1.1	0.563
APGAR, 5. minutes*	7.9±0.9	8.1±0.9	7.9±1.0	0.760
Duration of NICU (day)*	16.4±9.9	15.9±11.0	16.1±11.2	0.986
Female sex, n (%)	10 (45.5)	13 (59.1)	10 (45.5)	0.580
NSVD, n (%)	6 (27.3)	8 (36.4)	7 (31.8)	0.811
Mech. vent. (yes), n (%)	6 (27.3)	5 (22.7)	5 (22.7)	0.921
Nasal CPAP (yes), n (%)	12 (54.5)	10 (45.5)	10 (45.5)	0.785
Surfactant (yes), n (%)	6 (27.3)	5 (22.7)	7 (31.8)	0.795
TPN (yes), n (%)	8 (36.4)	7 (31.8)	6 (27.3)	0.811
Maternal Characteristics				
Age (years)*	30.0±6.4	29.1±5.3	28.0±4.9	0.481
Education (years)*	9.3±4.23	9.6±3.7	11.6±3.8	0.118
Housewife, n (%)	16 (72.7)	15 (68.2)	12 (54.5)	0.420
Primipar, n (%)	10 (45.5)	7 (31.8)	13 (59.1)	0.192
Paternal Characteristics				
Age (years)*	35.0±6.9	32.1±6.0	32.9±4.3	0.238
Education (years)*	9.4±3.0	9.6±3.7	11.4±4.2	0.154
Familial Characteristics				
Duration of marriage (years)*	6.4±4.6	8.1±4.9	5.7±5.1	0.240
Number of children*	1.8±0.8	2.2±1.0	1.5±0.8	0.400
Nuclear family, n (%)	16 (72.7)	14 (63.6)	18 (81.8)	0.400
Planned pregnancy, (yes), n (%)	17 (77.3)	12 (54.5)	17 (77.3)	0.166
Monthly income, n (%)				0.290
Income ≥ expense	17 (77.3)	14 (63.6)	18 (81.8)	
Income < expense	5 (22.7)	8 (36.4)	4 (18.2)	

*Mean ± standard deviation

NSVD, normal spontaneous vaginal delivery; Mech. vent, mechanical ventilation; CPAP, continuous positive airway pressure; TPN, total parenteral nutrition

Table 3 Breastfeeding and complementary feeding characteristics

Characteristics n (%)	Standard Care Group (n=22)	Mother Education Group (n=22)	Family Education Group (n=22)	p value
When did you decide to breastfeed?				0.345
Before pregnancy	16 (72.7)	17 (77.3)	21 (95.5)	
Breastfeeding experience				0.094
Yes	10 (45.5)	15 (68.2)	8 (36.4)	
How long are you planning to breastfeed?				**0.014**
≥ 2 years	11 (50.0)	21 (95.5)	20 (90.9)	
Breastfeeding				
Discharge and 1 week after discharge				0.242
Exclusive	19 (86.4)	20 (90.9)	16 (72.7)	
Mixed	3 (13.6)	2 (9.1)	6 (27.3)	
Formula	-	-	-	
1st month, CA				0.126
Exclusive	12 (54.5)	18 (81.8)	13 (59.1)	
Mixed	8 (36.4)	3 (13.6)	9 (40.9)	
Formula	2 (9.1)	1 (4.5)	-	
3rd month, CA				**0.008**
Exclusive	6 (27.3)	16 (72.7)	13 (59.1)	
Mixed	13 (59.1)	5 (22.7)	8 (36.4)	
Formula	3 (13.6)	1 (4.5)	1 (4.5)	
4th month, CA				**<0.001**
Exclusive	3 (13.6)	16 (72.7)	12 (54.5)	
Mixed	14 (63.6)	5 (22.7)	8 (36.4)	
Formula	5 (22.7)	1 (4.5)	2 (9.1)	
6th month, CA				**0.022**
Exclusive	6 (27.3)	15 (68.2)	12 (54.5)	
Mixed	9 (40.9)	5 (22.7)	8 (36.4)	
Formula	7 (31.8)	2 (9.1)	2 (9.1)	
No breastfeeding				
9th month, CA	8 (36.4)	2 (9.1)	3 (13.6)	0.051
12th month, CA	11 (50.0)	4 (18.2)	5 (22.7)	**0.046**
Complementary feeding, (yes)				
3rd month, CA	1 (4.5)	-	-	0.362
4th month, CA	9 (40.9)	1 (4.5)	1 (4.5)	**0.001**
5th month, CA	17 (77.3)	3 (13.6)	3 (13.6)	**<0.001**
6th month, CA	19 (86.4)	22 (100)	22 (100)	**0.043**
9th month, CA	21 (95.5)	22 (100)	22 (100)	0.362
12th month, CA	22 (100)	22 (100)	22 (100)	-

CA, corrected age

Statistically significant ($p<0.05$) shown in bold.

to the SCG the probability of infants in the FEG to be fed EBF was higher 3.85 times (OR:3.85, 95 Cl 1.01-13.66), 7.6 times (OR:7.60, 95 Cl 1.73-33.34) and 6.33 times (OR:6.33, 95 Cl 1.45-27.73) respectively at 3, 4 and 6 months CA. Similarly, it has been found that the probability of EBF in the MEG was higher 7.11 times (OR:7.11, 95 Cl 1.89-26.80), 16.89 times (OR:16.89, 95 Cl 3.63-78.56) and 13.57 times (OR:13.57, 95 Cl 2.99-61.59) compared to the SCG, respectively at 3, 4 and 6 months CA.

At 9 months CA, 36.4% of the infants and at 12 months CA 50% of the infants were not receiving breast milk in SCG, and this rate at the 12 months CA was significantly higher than the other two education groups (p=0.046) (Table 3).

In our study, one baby at 3 months CA (4.5%), nine babies at 4 months CA (40.9%), and 17 babies (77.3%) at 5 months CA had complementary feeding in the SCG. No infant had complementary feeding at 3 months CA in the MEG and FEG. The rate of infants who started complementary feeding at 4 and 5 months CA in SCG was significantly higher than the other two groups (p=0.001 and p<0.001, respectively). While all babies were introduced with supplementary food in MEG and FEG at 6 months CA, this rate was found to be 86.4% in SCG (p=0.043) (Table 3).

When the mother's perception of her baby was evaluated, the mothers in both MEG and FEG were determined to have a more positive perception of their infants at all times. However, only the result at 6 months CA was not statistically significant (p=0.072) (Table 4).

In the evaluation of mother-infant attachment, the mothers in SCG were found to have the lowest values at 1, 2, 3 and 4 months CA. The MAI scores of the mothers in MEG and FEG were similar and significantly higher than the SCG mothers (p<0.001) (Table 4).

Table 4 The mother's perception of the infant, mother-infant and father-infant attachment

Characteristics (Mean±std dev.)	Standard Care Group (n=22)	Mother Education Group (n=22)	Family Education Group (n=22)	p value
Mother's Perception of their infant				
1 wk after discharge	20.3±7.1[a,b]	13.8±4.5	13.7±4.5	**<0.001**
1st month, CA	20.4±7.4[b]	16.6±5.7	15.0±6.6	**0.026**
3rd month, CA	19.5±6.7[a,b]	14.3±6.3	13.8±6.1	**0.014**
6th month, CA	17.6±7.6	13.1±5.5	13.7±7.2	0.072
12th month, CA	17.9±6.2[a,b]	12.6±4.9	12.8±6.2	**<0.001**
Mother-infant attachment				
1st month, CA	93.0±6.0[a,b]	100.7±3.4	99.9±6,01	**<0.001**
2nd month, CA	92.2±6.5[a,b]	98.7±4.2	99.5±3.9	**<0.001**
3rd month, CA	90.3±7.1[a,b]	99.9±4.4	99.9±4.6	**<0.001**
4th month, CA	89.3±7.2[a,b]	99.9±4.3	100.1±4.3	**<0.001**
Father-infant attachment				
6th month, CA				
Patient-tolerance	31.9±5.2[b]	33.5±4.9	35.9±3.5	**0.016**
Pleasure in interaction	23.3±4.8[b]	25.4±3.9	27.2±3.9	**0.010**
Love-pride	12.6±1.9[a,b]	13.9±1.3	14.0±1.3	**0.009**
12th month, CA				
Patient-tolerance	32.1±5.6	32.7±5.2	32.1±4.0	0.106
Pleasure in interaction	25.0±4.9	25.8±4.0	26.6±5.7	0.562
Love-pride	13.2±1.6[b]	13.8±1.7	14.5±0.7	**0.004**

std. dev, standard deviation; wk, week; CA, corrected age

Statistically significant (p<0.05) shown in bold

a: p<0.05, compared to SCG and MEG

b: p<0.05, compared to SCG and FEG

The father-infant attachment points in all three sub-dimensions were highest in FEG fathers and lowest in SCG fathers at 6 months CA, and the difference was statistically significant (p=0.016 for patience and tolerance, p=0.010 for pleasure in interaction and p=0.009 for love and pride). In the "love and pride" sub-dimension, the points of MEG fathers were significantly higher than those of SCG at 6 months CA. The results of all three groups at 12 months CA were similar, with the only difference was that the significantly higher scores of FEG than SCG in the sub-dimension of "love and pride" (p=0.004) (Table 4).

The state-anxiety levels of the fathers were similar in all groups (p>0.05), but the highest anxiety level was seen in the SCG mothers. At 3 months CA, the anxiety level of SCG mothers was significantly higher than the mothers of the other two groups, and at 6 and 12 months CA, significantly higher than the level of FEG mothers (p<0.001 and p<0.001, respectively) (Table 5).

Discussion

It has been determined that MLPI have serious problems in early initiation and maintenance of breastfeeding due to inpatient monitoring in NICU, long-term hospital follow-up requirements, and high re-hospitalisation rates.[1,5,6] In addition, it has been reported that breastfeeding is challenging in these babies since they are more hypoactive and hypotonic compared to term babies, they get tired quickly, and their sucking-swallowing coordination is insufficient.[22] Goyal et al,[5] reported that low rates of EBF in late premature infants compared even with early premature infants. The EBF rate of MLPI at the time of discharge was reported between 20% and 60% in several studies.[2,6,23,24] All infants in our study were on breastfeeding at the time of discharge. The EBF rates at the time of discharge were similar, with over 70% in all three groups. Our breastfeeding rates on discharge were higher than in previous studies. We think that this result is related to the fact that our hospital is a "baby-friendly hospital," as well as the sensitivity of our healthcare staff.

In the current study, although the breastfeeding rates of the groups were similar at one week after discharge and at 1-month CA, it was noteworthy that there was a remarkable decrease in rates of breastfeeding and EBF in the SCG as the infants grew. In our study, one-third of the infants (31.8%) were not on breastfeeding in the SCG at 6 months, CA. In a study performed in late premature infants, the rate of EBF and not receiving any breast milk were reported as 20% and 52% in the 3rd month. In the same study, the rate of breastfeeding and EBF was 24% and 12% in the 6th month, respectively.[2] In a previous study, EBF rate of premature infants at 2, 4, and 6 months

Table 5 The state anxiety levels of the mothers and fathers

State Anxiety Inventory Scores (Mean±std dev.)	Standard Care Group (n=22)	Mother Education Group (n=22)	Family Education Group (n=22)	p value
Mothers				
In NICU after birth	42.8±11.7	39.8±8.8	42.2±12.2	0.638
1st month, CA	40.0±10.6	33.9±7.6	34.2±10.2	0.065
3rd month, CA	38.3±7.6[a,b]	29.1±7.5	30.9±9.2	**<0.001**
6th month, CA	38.8 ± 7.3[b]	34.5±9.2	31.6±8.4	**<0.001**
12th month, CA	37.5±6.8[b]	32.4±7.4	32.0±8.5	**<0.001**
Fathers				
In NICU after birth	39.1±9.6	38.1±10.1	40.2±10.9	0.803
1st month, CA	36.7±8.4	37.4±10.7	35.0±10.2	0.710
3rd month, CA	37.4±7.0	34.7±9.7	31.0±9.7	0.064
6th month, CA	34.6±7.2	33.6±9.1	30.7±8.0	0.260
12th month, CA	34.7±7.6	32.4±8.3	30.4±8.6	0.239

std. dev, standard deviation; NICU, neonatal intensive care unit, CA: corrected age

Statistically significant (p<0.05) shown in bold

a: p<0.05, compared to SCG and MEG

b: p<0.05, compared to SCG and FEG

were reported to be 51%, 37%, and 9%, respectively.[25] In another study, the rates were reported as 66%, 38%, and 13% in premature infants at 1, 4, and 6 months, respectively.[26] In the literature, educating families and home visits have been shown to contribute positively to EBF and breastfeeding for both term infants and MLPI, similar to our study. Morrow et al,[27] reported that the EBF rate in term infants at three months was 67% in the group that was visited six times in the home, while the group that had three visits this rate was 50% and expectedly the group that did not receive any visits the ratio decreased to 12%. Ravn et al,[28] also stated that the rate of breastfeeding was 77.3% in the education given group and 63.6% in the uneducated group in MLPI.

In a review including 73 studies and the information of 74.656 mothers and term babies, it was stated that high background initiation rates of breastfeeding, spousal support, and special education interventions made face-to-face 4-8 times were effective in the improvement of EBF.[29] The results of our study, which includes similar features in terms of intervention methods, coincide with the results of term babies. In our study, it was noticed that the EBF rates were significantly higher in the education groups compared to the control group as the baby grows. Especially in the 4th month, this rise is most prominent, and compared to SCG, probability of EBF was found to be 16.89 times higher in MEG and 7.6 times higher in FEG. However, more studies are needed on this subject for MLPI. We believe that solving the breastfeeding problems promptly with the education program and home visits explain the high rates of EBF and breastfeeding determined in our study. On the other hand, in current study although not statistically significant, the rates related to breastfeeding in MEG were better than FEG. This result suggests that the main target of the education provided was mothers and that the effect of fathers on breastfeeding was limited. It has been reported in previous studies that educational interventions on families were the most effective methods in supporting breastfeeding and reducing the risk of cessation of breastfeeding by 10-33%.[30]

WHO recommends that term infants should be fed with EBF in the first 6 months, and complementary foods with high nutritional value in addition to breastfeeding should be initiated from the 6th month.[11] It was reported that early initiation of complementary feeding did not provide additional improvement in the growth of the infant, and even increased the frequency of atopic diseases, gastrointestinal infections, and obesity.[31,32] On the other hand, delay of initiation of complementary foods has been associated with increased celiac disease, wheat allergy, type 1 diabetes disease, iron deficiency anemia, eating disorders, and anorexia.[33] These data were achieved from studies subjecting term infants; therefore, it was also discussed whether chronological age or CA would be used for transition to complementary food in premature infants. Norris et al,[12] determined that the initiation of complementary feeding in MLPI was earlier than recommended and that they started supplementary food in an average of 16.3 weeks according to chronological age, and 11.8 weeks according to CA while babies who received EBF were introduced with complementary food later. Fewtrell et al,[34] reported that early initiation of complementary foods in premature infants reduces breast milk intake. In our study, the babies in MEG and FEG have introduced with complementary food mostly at 6 months CA, while the initiation of complementary feeding in SCG tends to be earlier or later. Similar to previous studies, lower breast milk rates in SCG may be a reason for the initiation of complementary feeding in the early periods, and early complementary feeding may have reduced breast milk rates.[12,34]

It has been reported that parents of premature infants had higher levels of anxiety at birth and in the following months compared to parents of term infants.[35] In our study, while state anxiety levels of fathers were similar at all times, it was observed that mothers had similar anxiety levels in the first months. However, from 3 months, CA onwards, the lowest anxiety levels were seen in the FEG mothers and the highest in the SCG. In previous studies, it was stated that anxiety in premature baby parents was significantly lower in intervention groups receiving social support, but the difference disappeared as the baby grew.[36-38] Also, the anxiety levels of parents of MLPI decreased as the baby grew in our study. Our results show that the education and support given to the parents was effective in making a significant difference in the anxiety levels of the mothers, and the participation of fathers in the FEG to the education seemed to play a role in reducing the anxiety of the mothers. The anxiety levels of parents with a premature infant gradually reduce over time, but with social support, this period is shortened.[39,40]

Preterm delivery is a risk factor for early mother-baby interaction. However, a safe mother-baby interaction and attachment are necessary for both the mother's and child's healthy mood. It has been reported that mothers of premature infants develop severe fears about the safety of their babies and have difficulties in accepting their babies

and establishing harmonious communication compared to mothers of term babies.[41] In order to prevent this situation, education programs starting at the hospital and continuing at home after discharge is the most effective intervention.[4] In a study, it was shown that the educational training conducted in NICU aiming to increase mother-baby interaction reduces anxiety levels of mothers and provides a more positive mother-baby communication when the babies are two months old.[42] In another study, the education given after discharge was found to be associated with low anxiety symptoms in parents of premature infants at postnatal 6 and 12 months.[36] Newnham et al,[37] also showed that early intervention increased the quality of mother-infant interaction and better communication skills in infants with less regulatory problems in premature babies. Recently, it has been shown that educational intervention has positive effects on the mental health of the mother rather than premature babies.[28,43] In our study, MAI scores were higher in both education groups, and it can be said that mothers performed a healthier attachment with their babies as a result of the intervention. These results may be in association with the mothers' reduced anxiety levels and high rates of breastfeeding.

Positive thoughts of the mother about her baby may also affect the healthy mother-infant attachment. It has been reported that mothers have a negative perception of their premature infants starting from birth and sometimes continuing for years.[44,45] In a previous study, the premature infants in the intervention group were easier and more approachable by their mothers compared to a control group, and at six months, they were described as more compliant and happy.[37] Similarly, the results of the current showed that mothers in the education group had a more positive perception of their infants. The positive baby perceptions in MEG and FEG started at one week after discharge and continued up to 12 months, CA. When mothers are supported to perceive their baby's tips correctly and respond appropriately, a more sensitive mothering model and a stronger mother-infant attachment can be provided.[4,37,46-48]

On the other hand, the effects of premature birth on father-infant attachment are controversial, and there are few studies on this subject. A previous study has shown that there was no significant difference between the fathers of MLPI and term infants regarding the bonding model, but the fathers of premature infants were seen to be more hesitant and have a more negative attitude in communication with the infant. Therefore, to avoid the risk of an unhealthy bonding model, giving information to the parents on the subject of communication with the infant is the most fundamental approach.[45,49] As a matter of fact, in our study, in the FEG, where fathers also participated in the training program, the PPAQ scores were the highest in all sub-dimensions at six months CA. The father-infant attachment results of the groups were similar as the infant grew over time. These results suggest that the fathers took a more active role in interaction with the infant as time went on. The education given to the fathers seems to be effective in the development of a more potent bonding model with an earlier start. The similarity of the results of the MEG and FEG at six months particularly suggests that mothers indirectly influence the fathers even if they are not included in the education program. Consistent with the findings of previous studies, the results of the current study showed the positive effect of the education on father-infant attachment.[45,50]

The strong aspects of this study are that it was designed as a randomised, controlled study with a specific group evaluation (MLPI), and the extensive data presented were obtained throughout a long follow-up period. However, for many reasons, the findings should be interpreted with caution. The most important limitation of the study is that the data of the assessment scales are based on the statements of the mothers and fathers.

In conclusion; the educational training program and home visits that were given to families of MLPI had positive contributions to the EBF and breastfeeding of these babies and on the transition to the right time-appropriate complementary nutrition. While the education program provided a significant decrease in anxiety levels of mothers, it also had positive effects on mother-infant and father-infant attachment. In order to reduce the experienced problems by the families of MLPI, a standard education and support program should be applied to this group. For the development of the infant and public health, there is a need for further studies in this area, which include the fathers.

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Declaration of Interest

The authors declare no conflicts of interests.

Disclosure

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