The Effect of Pre-Hospital Discharge Educational Program on Preterm Infants and their Mothers

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Abstract:

Preterm birth is truly a global problem, is a major determinant of neonatal mortality and morbidity and has long-term adverse consequences for health. **The aim of the current study** was to evaluate the effect of pre-hospital discharge educational program for mothers of preterm infants on their level of knowledge and reported practice and to evaluate the effect of the program on Preterm infants' physical illness, growth and development. **Materials and Method :** The study utilized a quasi-experimental research design. The study sample consisted of 50 mothers and their preterm infants they were randomly assigned into study or control group using simple random sampling. The study was conducted in the NICU at Benha Specialized Pediatric Hospital. The required data was collected using the following tools, structured interview sheet; preterm infant follow-up monitoring sheet and Denver Developmental Screening Instrument version II it developed by Frankenberg and Dodds (1992). **The study results** revealed that mothers who received the pre-hospital discharge educational program demonstrated significant higher mean score of knowledge and reported practice regarding care of their preterm infants at 8th and 16th weeks after hospital discharge than those in the control group. The highest percentages of preterm infants whose mothers had been involved in the educational program had fewer physical illnesses and had normal basic developmental milestones after hospital discharge than those in the control group. These results support the proposed study hypotheses. **It was recommended** that supporting and involving parents in the discharge process is mandatory to give them confidence in caring for their preterm infant at home.

Key Words: Pre-hospital discharge educational program-Preterm Infants- Mothers

Introduction

Preterm birth defined as childbirth occurring at less than 37 completed weeks or 259 days of gestation, it is a major determinant of neonatal mortality and morbidity and has long-term adverse consequences for health [1]. Neonates who born before the completion of 37th week of gestation are considered premature and are sometimes referred to as "preemies" [2]. Based on each year 15 million babies are born preterm and their survival chances vary dramatically around the world. More than 80% of preterm neonates are born between 32 and 37 weeks of gestation (moderate/late preterm), and die needlessly for lack of simple, essential care such as warmth and feeding support. [3]

Preterm birth rates have been reported to range from 5% to 7% of live births in some developed countries, but are estimated to be substantially higher in developing countries. Preterm birth is truly a global problem, but over 60% of preterm births occur in Africa and South Asia. Causal factors linked to preterm birth include medical conditions of the mother or fetus, genetic influences, environmental exposure, infertility treatments, behavioral and socioeconomic factors and iatrogenic prematurity. Furthermore, estimates of the rate of preterm birth in developing countries are limited and influenced by a range of factors including varying procedures used to determine gestational age, national differences in birth registration processes, heterogeneous definitions used for preterm birth, differences in perceptions of the viability of preterm infants. These issues make measurement of preterm birth and comparisons across and between developing countries difficult [4].

Prematurity is considered to account for 27% of four million neonatal deaths annually. In low-income countries, the mortality rate of premature infants is six times higher than that of high-income countries [5]. In Egypt, Ministry of Health and Population indicated that there were 2.4 million births in 2011, around 10% of those babies will have needed neonatal incubation. The neonatal mortality rate increased to 38% at 2012 [6] The survival rate of preterm infant has increased with the transformation of health care, especially with advances in the neonatal area. However, despite the increased survival, this advance does not exclude the possibility of the development of morbidities in newborn infants requiring intensive care, which interfere with the quality of life of these infants [7]

According to preterm infants are vulnerable to various physiological handicapped conditions with high mortality rate due to their anatomical and functional immaturity.

Among these alterations in respiratory functions; immaturity of nervous system, disturbances of circulatory system, impaired thermoregulation, insufficient gastrointestinal and hepatic functions, metabolic disorders, increased susceptibility to infections and impaired renal functions. [8, 9]

Additionally, mentioned that, children that are born prematurely have higher rates of cerebral palsy, sensory deficits, learning disabilities and respiratory illnesses compared with children born at term. The morbidity associated with preterm birth often extends to later life, resulting in enormous physical, psychological and economic costs. Recently emphasized that, in preterm survivors, there is a high rate of long-term neurodevelopment impairment and chronic health problems. These chronic medical and neurodevelopmental complications often require additional health care and educational services, which add to the overall economic cost of caring for the preterm infant. [10,11]

Mothers whose babies are born prematurely are often scared and nervous. Preterm neonates have increased risk of complications. The risks increase the earlier the neonate is born [2]. Several previous studies have identified the following challenges in parents of preterm infants experienced both within the hospital and afterwards: stress and anxiety; depression and grief; decreased confidence and self-efficacy in parenting; impaired parent-child interactions and role development; need for additional knowledge and caregiving skills; and need for increased social and professional support [10].Moreover, documented that parents of preterm infants, often feel overwhelmed. They need the support of the nursing staff to dispel their concerns about how to handle their infants, and to encourage them to gain confidence in caring of their infants [5].

Discharge readiness of preterm infants is usually determined by demonstration of functional maturation including, the physiological competencies of thermoregulation, control of breathing, respiratory stability, feeding skills and weight gain. At the time of discharge home, parents of these neonates in the neonatal intensive care unit (NICU) often feel apprehensive and may question their ability to care for their infant. The well-planned, comprehensive discharge of a medically stable infant helps to ensure a positive transition to home and safe, effective care after discharge [12]. Many infants achieve these physiological milestones between 34 and 36 weeks, although there is individual variability and extremely preterm infants often require more time [13].

Prior discharge, the family is given an appointment for the first visit and subsequent follow-up visits. Mothers consider it very important to talk with health professionals about their infants; when this does not occur, these mothers express a sense of carelessness. Mothers should be taught prior hospital discharge about educational materials to help ensure adequate home care [14]. Mothers should be informed about the care of the preterm infants after discharge at home. They should be instructed about breast feeding, warmth, general hygiene, infection precaution measures, environmental hygiene, immunization and basic developmental millstones [8].

Nursing care of the high risk neonate has become an extremely technologically enhanced specialty over 50 years and has rapidly evolved into a dynamic field of nursing care [15]. The nurse must care for the child within the context of the family [16]. According to there is also a need to understand the family as a focus of nursing care, and to reflect on the need for advancing the search for building knowledge with active participation of family members. Authors point out that implementation of educational activities that combine information with practical interventions performed with premature infants, increases the interaction between the members, the family's mental well-being, and decreases the length of hospitalization [17].

Discharge planning begins at the time of NICU admission. Promoting family involvement in their infant's care, ongoing communication, enhancing parental understanding of their infant's medical issues, along with anticipatory guidance on preterm infant development and behavior, all help to decrease parental stress and anxiety and facilitate safe transition to home. Family-centered care maps, developmental care, facilities where parents can stay with their infant and programs to help parents interact with their infant are strategies that enhance communication and parent–infant interaction, improve family satisfaction and mental health outcomes, and decrease length of stay. Clarifying parental benefits helps working parents to plan employment leave during their infant's hospital stay. Ongoing parent education at the bedside, in parent groups, and with electronic and printed resources is essential [12]

Significance of the Study

Worldwide, every year, an estimated 15 million of the 135 million births were preterm and of those, 1.1 million died annually from prematurity and low birth weight complications. In Egypt, statistics of the Ministry of Health and Population indicated that there were 2.4 million births in 2011,

around 10% of those babies will have needed neonatal incubation. Increased survival of infants and earlier discharge practices during the last decades, raise the question of the adequacy of post-hospital care. Preterm infants suffer from a variety of health problems related to the immaturity of their vital organs, often requiring additional care and support after discharge. Therefore, mothers of preterm infants frequently receive limited care instructions and support after hospital discharge. Although prior studies have shown that pre-hospital discharge educational programs improve the functional ability and quality of life of adult patients. On the other hands, fewer studies could be located that has examined the effects of such programs on mothers of preterm infants. Thus, this study sought to test the effects of the pre-hospital discharge educational program for mothers of preterm infants on the mothers' transition from hospital to home, and their infants' physical illness, growth and development. The researchers expected the designed program would provide mothers with the tools needed to master care of their infants at home. The results of the current study could help clinical nurses design appropriate discharge education programs for mothers of preterm infants[17].

Aim of the study:

-To evaluate the effect of pre-hospital discharge educational program for mothers of preterm infants on their level of knowledge and reported practice.

To evaluate the effect of pre-hospital discharge educational program for mothers of preterm infants on infants' physical illness, growth and development.

Research Hypothesis:

The study results were testing the following hypotheses:

-Mothers who received pre-hospital discharge educational program will have higher mean score of knowledge and reported practice than those in the control group at 8th and 16th weeks after their preterm infants were discharged from the hospital.

1- Preterm infants of mothers who received pre-hospital discharge educational program will complain fewer physical illnesses, at 8th and 16th weeks after they discharged from the hospital than those in the control group.

2- Preterm infants of mothers who received pre-hospital discharge educational program will have normal expected range of Denver Developmental Screening scores at 8th and 16th weeks after they discharged from the hospital than those in the control group.

Materials and Method

Research design:

A quasi-experimental research design was utilized to conduct the current study.

Sample:

The study sample consisted of 50 mothers and their preterm infants they were randomly assigned into study or control group using simple random sampling. Mothers of preterm newborns were eligible for inclusion in this study if they met the following criteria: (1) had preterm infants whose gestational age was 32 weeks and 36 weeks and 6 days of gestation, as assessed by a physician using a Ballard scale and documented on the preterm infant's medical record and were admitted in the NICU at Benha Specialized Pediatric Hospital; (2) their preterm infants did not have any congenital abnormalities or critical illnesses (cardiac, central nervous system diseases, or gastrointestinal congenital anomalies).; and (3) were the primary caregiver of their infants after discharge and were inexperienced in caring for preterm newborns previously.

Setting:

The study was conducted at Intensive Care Units at Benha Specialized Pediatric Hospital.

Data Collection Tools:

1- **A structured interview sheet** developed by the researchers after extensive review of related literature, it included 73 question categorized under three main parts:

Part I: Involved 4 questions related to personal data about the participated mothers such as, age, level of education, occupation etc......

Part II: It composed of 9 questions concerned with data about the preterm infants such as gender, birth weight, and gestational age, causes of NICU admission and length of hospital stay. Data were obtained by checking the infant's medical records.

Part III: Included 30 questions to assess mothers' knowledge about care of preterm infants. It also involved 30 questions illustrated the reported mothers' practices provided for their preterm infants after discharge, such as mothers' practice related to feeding, hygienic care, immunization, sleeping and follow-up etc..... .

2- **Preterm infant follow-up monitoring sheet,** developed by the researchers to assess the infant health history and profile. It includes assessment and recording the physical illnesses each infant had encountered by the 8th and 16th week after hospital discharge.

3- **Denver Developmental Screening Instrument version II:** it developed by Frankenberg and Dodds (1992) [18], for assessing the critical millstones of the infants' level of gross and fine motor

development, as well as personal-social and language development for children aged 0-72 months. The researchers only utilized the items related to infants at 8 and 16 weeks of life. Scoring of the instrument involved indicating whether the infant "passed" or "failed" in performing each of the functional tasks. Responses then were compared to a chart that listed the normal expected range, for each task, based upon the child's age. As a result of where the infant's overall scores fell on the chart, he/she was classified as "normal" "suspect" or "delayed" in regards to development.

Scoring system: for mothers' knowledge and reported practice; each correct response took two scores, the incomplete one took one score and the wrong response or the not known/ done one took no score with a total score of 60 represent 100%. Total knowledge/ reported practice score above ($\geq$ 75%) considered good, score between (50% – less than 75%) considered average, meanwhile mothers' total score(less than 50%.) was considered poor.

Description of Pre-Hospital · Discharge Educational Program:

The pre-hospital discharge educational program was designed by the researchers after extensive review of related literature. It consisted of two main parts that included:

preparation of the mothers for discharge from hospital to home; and, provision of follow-up care after the mothers' and preterm infants' hospital discharge. The first part of the program was conducted four days prior to infants' discharge from the hospital based on the expectation of the neonatologist. It focused on: characteristics and feeding of preterm infants; physiological problems; daily infant care and the assessment/care of early signs/symptoms of infant illnesses. The second part of the program involved provision of post-hospital discharge and follow-up care. The post-hospital discharge activities, provided by the researchers included a half-hour session with each mother, during the 8th and 16th week post-discharge of each infant, to reinforce the infant care information provided during first part of the program.

Validity and Reliability:

Data collection tools were submitted to five experts (two neonatologists/ pediatrician and three neonatal/ pediatric nursing) to test the content validity. Modifications of the tools were done according to the experts' judgment on clarity of sentences, appropriateness of content and sequence of items. The experts' agreed on the content of the program, but recommended minor language changes that would make the information clearer and more precise. The suggested changes were made. Regarding reliability, the reliability

coefficients' alpha between questions was 0.72.

Data Collection Procedure:

An official permission to conduct the study was obtained from the director of the NICU. After the mothers accepted to participate in the study and were randomly assigned to either the study or control group, the researchers filled the interview sheet from the mothers who had preterm infants fulfilling the study criteria. The baseline mothers' knowledge about care of preterm infants was assessed. The time spent to fill in the sheet ranged between 30 to 45 minutes for each mother. Data about preterm infants were obtained by conducting a physical assessment of the infant, and checking the infant's medical records on individual bases.

The first part of the pre-hospital discharge program was conducted to the study group four days prior to their infants' discharge from the hospital as expected by neonatologists. Mothers in the study group were divided into 5 groups, each group involve 5 mothers. The researchers taught each group of mothers in a classroom setting in the out-patient clinic (for follow up) that lasted approximately 60-90 minutes for two consecutive days for each group of mothers. Information and instructions was presented via: a question/answer session; a discussion session; demonstration and re-demonstration;

and, printed materials in the form of illustrated Arabic booklet prepared by the researchers. It focused on: characteristics and feeding of preterm infants; physiological problems; daily infant care and the assessment/care of early signs/symptoms of infant illnesses. The mothers were given an opportunity to discuss their concerns about caring for their premature infants.

The post-hospital discharge activities, provided by the researchers included a half-hour session with each mother (both study and control group), during the 8th and 16th week post-discharge of each preterm infant. Data were obtained by questioning each mother about her infant's illnesses, conducting a physical assessment of the infant, and checking the infant's medical records. During each follow-up session the infants were assessed by the researchers in terms of body weight using infant scale, body length, and head circumference by measuring tape and the readings were plotted and interpreted based on Egyptian Growth Curve for children from birth till 36 months. The critical millstones and developmental tasks were assessed using Denver Developmental Screening Instrument version II at 8 and 16 weeks. It was evaluated by the researchers with the assistance of the assigned pediatrician, they determine if infant's responses fall into or outside of the normal

expected range of success on that item for the child's age. The number of items upon which the infant's scores below the expected age range determines whether the child is classified as within normal range, suspect, or delayed. Those with suspect and delayed scores were referred for further assessment. The time needed to assess each infant ranged 10 to 20 minutes.

Mothers' knowledge and reported practice were evaluated during each follow-up session. All of these activities were carried out in the follow-up clinic in the NICU. Mothers assigned to the control group received routine care. Routine care involved verbal instructions from the nurse and neonatologist, on the day of discharge, about providing care to a preterm infant and post-discharge follow-up visits schedule. The data collection procedure took 8 months, stated from February to September 2013.

Pilot Study:

The refined program was implemented with five mothers and their preterm infants who were similar to the subjects used in the study. Based upon the program implementation few changes were made in the program, such as omission of some items related to the infant's health status and diagnosis.

Ethical consideration:

All mothers received written and verbal explanations about the nature of the study; voluntary participation; what study involvement would entail; anonymity and confidentiality issues; and, the right to withdraw from the study at any time without repercussions and without any effect on their preterm infants' care. For research ethical consideration and based on the basic ethical principle of beneficence, upon the completion of the educational program, the researchers provided the mothers in the control group 20 to 30 minutes of verbal information regarding general care of preterm infant.

Statistical Analysis:

The collected data were categorized, tabulated, and analyzed using the SPSS computer program Version 17. Numerical data were expressed as mean and standard deviation. Qualitative data were expressed as frequency and percentage. The paired-sample t-test was used to compare the study and control group mothers' knowledge and practice mean scores at pre-test, and at 8 and 16 weeks post- hospital discharge. The paired-sample t-test was used to compare differences, between the study and control group, regarding the infants' weight, body length and head circumference at 8 and 16 weeks post-hospital discharge. Differences in infants' general health condition and in normal development, between the study and control group, at 8 and 16 weeks after hospital discharge, were assessed using Chi-square

test. Correlation among variables was done using Pearson correlation coefficient. Level of significance at p<0.05, 0.01, 0.001 were used as the cut of value for statistical significance. For statistical purposes, estimation and determination of the normal range of vital signs and growth measurements of the infants based on Nelson Textbook of Pediatrics (2011) 19th edition, which is a standardized pediatric reference.

Results

The results of the current study were divided into two parts: the first part was referred to the results pertinent to the mothers of preterm infants. The second one was related to the preterm infants. As regards the mothers, table (1) revealed that the mean age of mothers in the study group was 22 ±2.44 years increased to 25.6±4.89 years for the mothers in the control group. More than half (56%) of mothers in the study group were had secondary school education, while 48% of mothers in the control group were just read and write. The highest percentages (64% & 88% respectively) of mothers in both groups were house wives. There were no significant differences between study and control groups in sociodemographic characteristics of mothers (p=>0.05).

Concerning to the total mothers' knowledge regarding care of preterm infants, table (2) indicated that more than half (56% &52%

respectively) of them had poor level of knowledge before program implementation. The mean of the total score of mothers' knowledge in the study group was 35.7±7.9 and 33.32±4.18 for the control group, and there was no statistically significant difference between both groups (p=>0.05). After program implementation at 8th weeks after hospital discharge, 92% of the mothers in the study group had good level of knowledge, while, all (100%) of mothers in the control had average level. The mean of the total score of mothers' knowledge in the study group was 55.88±4 compared to 38.36±4.8 for mothers in the control group, and there was statistically significant difference between both groups (p=<0.001).

To evaluate the knowledge retention among mothers at 16th weeks after hospital discharge, the same table proved that, more than half (52%) of them had good level of knowledge and 64% of mothers in the control group had poor level. There was statistically significant difference between both groups (p=<0.001).

As shown in table (3) 84% and 100% respectively of mothers had average level of total practice before program implementation. The mean of the total score of mothers' practice in the study and control group was (30.9±5.61 & 29.5±2.43 respectively). There was no statistically significant difference between both groups (p=>0.05). At 8th weeks

after hospital discharge, 92% of the mothers in the study group had good level of practice, while, most (96%) of mothers in the control had average level. The mean of the total score of mothers' practice in the study group improved to 47.40±4.16. On the other hand, it was 32.52±3.9 for mothers in the control group, and there was statistically significant difference between both groups (p=<0.001).

Regarding to the level of total practice among mothers at 16th weeks after hospital discharge, the same table demonstrated that, 72% of mothers in the study group had good level of practice and the vast majority (92%) of mothers in the control group had average level. The means of the total score of practice among mothers in both groups were (39.16±5.55 & 31.04±4.43 respectively) and there was statistically significant difference between both groups (p=<0.001).

The study results proved that there was statistically significant correlation between the age of mothers in the study group and their level of knowledge and practice regarding the care of preterm infants. (p=<0.001). However, there were no statistically significant correlations between the level of education and occupation of mothers in the study group and their level of knowledge and practice (p=>0.05).

The second part of the study results was pertinent the characteristics of preterm infants in both groups, table (4) evident that 68% and 60% respectively of them were males. More than half (56%) of them in the study group and 48% of the control group their gestational age (GA) ranged from 32-33 weeks. The mean of GA for study group was 32.4±5.22 weeks increased to 36.4±3.16 weeks for control group. On the same context, 56% and 52% respectively of them in both groups their birth weight was less than 1500 grams. Respiratory distress syndrome (RDS) was the chief diagnosis among 92% and 80% respectively of preterm infants in both groups. The vast majority (96% & 92% respectively) of them in both groups were hospitalized in the NICU for more than three weeks.

As regards the comparison between preterm infants in both groups according to their growth measurements as plotted on Egyptian growth curve at 8th weeks after hospital discharge, (table 5) highlighted that, 80% of infants in the study group had appropriate body weight compared to 32% of the control group. The means of the infants' weight in both groups were 4.02±.73 kg and 4.61±1.2 kg respectively. As regards their length, 72% of infants in the study group had appropriate length and the mean was 52.62±3.21cm while, 56% of infants in the control group the mean of their length was 50.04±3.43 cm. There was statistically significant difference between the means of infants' length in both

groups (p=<0.001). More than three quarters (76%) of them in the study group and 48% of the control group had appropriate head circumference. In relation to the infants' vital signs, the same table demonstrated that the vast majority of infants in the study group and the highest percentages of them in the control group had normal means of vital signs.

With respect the comparison between preterm infants in both groups according to their growth measurements and vital signs at 16th weeks after hospital discharge, the same table evident that, 76% and 52% respectively of infants in both groups had appropriate body weight. Regarding to their length, 84% of infants in the study group and 52% of them in the control group had appropriate length and there was no statistically significant difference between the means of infants' length in both groups (p=>0.005). Eighty four percent of them in the study group and 60% of the control group had appropriate head circumference, with statistically significant difference between the means of infants' head circumference in both groups (p=<0.001). Similarly, the vast majority of infants in the study group and the highest percentages of them in the control group had normal means of vital signs after 16th weeks after hospital discharge.

Concerning the comparison between preterm infants in both groups according to their general health condition at 8th weeks after hospital discharge, table (6) proved that the vast majority (92%) of infants in the study group and 48% of infants in the control group their skin color appeared normal. The majority (84%) of infants in the study group were breast fed, unfortunately, 40% of infants in control group stopped breast feeding and totally dependent on the artificial formula. There was highly statistically significant difference between infants in both groups regarding their feeding pattern (p=<0.001). About one quarter (24%) of infants in the study group complained from repeated episodes of diarrhea, this percentage increased to 40% in the control group. There was statistically significant difference between infants in both groups related to their health problems encountered during the first 8th weeks after hospital discharge (p=<0.05) (table 6).

It is evident from the same table that 80% of infants in the study group were exclusively breast fed during the 16th weeks follow up visit, and 40% of infants in control group were on breast feeding and complementary feeding using artificial formula. Apparently, the results proved that infants in the control group complained from repeated episodes of diarrhea, vomiting, diaper rash and fever than infants in the study group. There was statistically significant difference between

infants in both groups related to their health problems encountered during the first ١٦th weeks after hospital discharge (p=<0.001).

In relation to the comparison between preterm infants in both groups according to their Denver Developmental Scale II at 8th weeks after hospital discharge table (7) highlighted that, there was no statistically significant difference between infants in both groups concerning the gross motor milestones at 8th weeks after hospital discharge (p=>0.05). On contrary, there were statistically significant differences between infants in both groups concerning the fine motor, language, and personal-social milestones at 8th weeks after hospital discharge (p=<0.001).

As noted in table (8) there was no statistically significant difference between preterm infants in both groups concerning the gross motor milestones at 16th weeks after hospital discharge (p=>0.05). On contrary, there were statistically significant differences between premature infants in both groups concerning the fine motor, language, and personal-social milestones at 16th weeks after hospital discharge (p=<0.01). It was evident from the study results that infants in the control group showed a higher percentage of "suspect" delayed development than infants in the study group.

Table (1): Percentage Distribution of studied Mothers' according to Sociodemographic Characteristics

Characteristics	Study Group (n=25)		Control Group (n=25)		X^2	P
	No	%	No	%		
Mothers' age/years:						
-< 20	4	16	3	12	1.18	>0.05
- 20-<25	8	32	18	72		
- 25 - <30	8	32	4	16		
- ≥ 30	5	20	0	0		
Mean +SD	22 ±2.44		25.6±4.89			
Mothers' level of education:						
-Read and write	4	16	12	48	0.014	>0.05
-Secondary school education	14	56	11	44		
-University education	7	28	2	8		
Mothers' occupation:						
-Working outside home	9	36	3	12	0.14	>0.05
- House wife	16	64	22	88		

Table (2): Comparison between the Total Mean Score of knowledge among Mothers in Both Groups before Program Implementation, at 8th and 16th Weeks after Hospital Discharge

Total Knowledge	Study group n=25						Control group n=25						t-test	P
	Good		Average		Poor		Good		Average		Poor			
	No.	%	No.	%	No.	%	No	%	No	%	No	%		
Pre-test	3	12	8	32	14	56	0	0	12	48	13	52		
Mean ± SD	35.7±7.9						33.32±4.18						1.262	>0.05
Post-test at 8th weeks	23	92	2	8	0	0	0	0	25	100	0	0	10.24	<0.001
Mean ±SD	55.88±4						38.36±4.8							
Post-test at 16th weeks	13	52	12	48	0	0	0	0	9	36	16	64	12.72	<0.001
Mean ±SD	49 ±4.6						35.3±3.26							

Table (3): Comparison between the Total Mean Score of Reported Practice among Mothers in Both Groups before Program Implementation and at 8th and 16th Months after Hospital Discharge

Total Practice	Study group n=25						Control group n=25						t-test	P
	Good		Average		Poor		Good		Average		Poor			
	No.	%	No.	%	No.	%	No	%	No	%	No	%		
Pre-test	4	16	21	84	0	0	0	0	25	100	0	0		
Mean ± SD	30.9±5.61						29.5±2.43						1.434	>0.05
Post-test at 8th weeks	23	92	2	8	0	0	1	4	24	96	0	0	10.260	<0.001
Mean ±SD	47.40±4.16						32.52±3.95							
Post-test at 16th weeks	18	72	7	28	0	0	1	4	23	92	1	4	-4.43	<0.001
Mean ±SD	39.16±5.55						31.04±4.43							

Table (4) Percentage Distribution of Characteristics of Premature Infants in the Study and Control Groups

Characteristics of Premature Infants	Study Group (n=25)		Control Group (n=25)	
	No	%	No	%
Gender:				
-Male	17	68	15	60
-Female	8	32	10	40
Gestational age:				
- 32 – 33 weeks	14	56	12	48
->33 - <35 weeks	9	36	6	24
- 35 - ≤ 37 weeks	2	8	7	28
Mean +SD	32.4±5.22		36.4±3.16	
Birth weight/grams:				
- <1500	14	56	13	52
- 1500 - <2000	11	44	11	44
- 2000 - <2500	0	0	1	2
Diagnosis:				
- RDS	23	92	20	80
- Neonatal Jaundice	2	8	4	16
- Hypocalcaemia	0	0	1	4
Hospital stay/ weeks:				
- 2- <3 weeks	1	4	2	8
- 3 weeks and more	24	96	23	92

Table (5): Comparison between Preterm Infants in both Groups according to their Growth Measurements and Vital Signs at 8th and 16th Weeks after Hospital Discharge

Items	Study Group 8th Week (n=25)		Control Group 8th Week (n=25)		t-test	P	Study Group 16th Week (n=25)		Control Group 16th Week (n=25)		t-test	P
	NO	%	NO	%			NO	%	NO	%		
Weight:												
- Appropriate	20	80	8	32			19	76	13	52	-2.99	>0.05
- Subnormal	2	8	8	32	2.12	>0.05	6	24	2	8		
- Above normal	3	12	9	36			0	0	10	40		
Mean ±SD	4.02±.73		4.61±1.2				5±.56		5.76±1.12			
Length:												
- Appropriate	18	72	11	44			21	84	13	52		
- Subnormal	7	28	14	56	17.46	<0.001	4	16	0	0	2.56	>0.05
- Above normal	0	0	0	0			0	0	12	48		
Mean ±SD	52.62±3.21		50.04±3.43				57.4±3.9		59.9±3.16			
Head Circumference:												
-Appropriate	19	76	12	48			21	84	15	60		
- Subnormal	6	24	10	40	-.785	>0.05	4	16	0	0	-5.61	<0.001
- Above normal	0	0	3	12			0	0	10	40		
Mean ±SD	34.18±1.49		34.76±2.79				38.8±1.6		40.2±2.8			
Temperature:												
- Normal	25	100	15	60			25	100	13	52		
- Sub-normal	0	0	0	0	2.84	<0.05	0	0	0	0	2.56	>0.05
- Above-normal	0	0	10	40			0	0	12	48		
Mean ±SD	36.75±.36		37.42±1.37				36.9±.36		37 ±1.3			
Respiration;												
- Normal	24	96	19	76			23	92	16	64		
-Sub-normal	0	0	0	0	1.50	<0.05	0	0	0	0	2.375	>0.05
-Above-normal	1	4	6	24			2	8	9	36		
Mean ±SD	33.08±6.43		35.96±5.5				33.6±5.5		40.8±13.2			
Pulse:												
-Normal	23	92	12	48			25	100	10	40		
-Sub-normal	2	8	3	12	2.13	<0.001	0	0	10	40	.738	>0.05
-Above-normal	0	0	10	40			0	0	5	20		
Mean ±SD	121±17.44		136.52±29.27				113.8±5.8		109.4±28.7			

Table (6): Comparison between Preterm Infants in both Groups according to their General Health Condition at 8th and 16th weeks after Hospital Discharge

Items	Study Group 8th Week (n=25) No	%	Control Group 8th Week (n=25) NO	%	X^2	P	Study Group 16th Week (n=25) No	%	Control Group 16th Week (n=25) NO	%	X^2	P
Colour:												
-Pale	2	28	9	36			7	28	9	36	9.76	<0.05
-Normal	23	92	12	48	31.72	<0.001	18	72	8	32		
-Flashed	0	0	4	16			0	0	8	32		
Feeding Pattern:												
-Exclusive breast feeding	21	84	6	24			20	80	5	20		
- Breast feeding and artificial formula	4	16	9	36	24.08	<0.001	5	20	10	40	9.84	<0.05
- No breast feeding	0	0	10	40			0	0	10	40		
Infants' Health Problems:												
- Diarrhea	6	24	10	40	11.12	<0.05	1	4	10	40		
- Vomiting	3	12	0	0			0	0	5	20		
- Diaper rash	0	0	8	32			0	0	5	20	13.600	<0.001
- Hyperthermia	0	0	7	28			11	44	5	20		

Table (7): Comparison between Preterm Infants in both Groups according to their Denver Developmental Scale at 8th Weeks after Hospital Discharge

Items	Study Group 8th Weeks (n=25)				Control Group 8th Weeks (n=25)				X^2	P value
	Pass		Failed		Pass		Failed			
	No	%	No	%	No	%	No	%		
Gross Motor:										
-Equal movements	21	84	4	16	14	56	11	44.	2.6	>0.05
- Lift head	23	92	2	8	10	40	15	60		
- Head up to 45°	21	84	4	16	12	52	13	56		
- Sit head steady	22	88	3	12	9	36	16	64		
Fine Motor:										
-Follow to midline	19	76	6	24	12	48	13	52	13.48	<0.001
-Follow to post line	17	86	8	32	10	40	15	60		
Language:										
-Respond to bell (sound)	20	80	5	20	10	40	15	60	20.72	<0.001
-Vocalize making cooing or short vowel sounds	18	72	7	28	7	28	18	72		
Personal- Social:										
- Regard face	17	68	8	32	11	44	14	56	14.44	<0.001
- Smile responsively	15	60	10	40	12	48	13	52		

Table (8): Comparison between Preterm Infants in both Groups according to their Denver Developmental Scale II at 16th Weeks after Hospital Discharge

Items	Study Group (n=25)				Control Group (n=25)				X^2	P value
	Pass		Failed		Pass		Failed			
	No	%	No	%	No	%	N	%		
Gross Motor:										
- Bear weight on legs	17	68	8	32	9	36.	16	64	6.04	>0.05
- Chest up arm support	19	76	6	24	14	56	11	44		
Fine Motor:										
-Grasp rattle	22	88	3	12	13	52	12	48	6.76	<0.01
-Hand together	19	76	6	24	11	44	14	56		
Language:										
- laughs	24	96	1	4	2	48	13	52	10.36	<0.01
- Squeals out loud	21	84	4	16	11	44	14	56		
Personal- Social:										
-Smile spontaneously	25	100	0	0	10	40	15	60	6.52	<0.01
-Regard own hand	20	80	5	20	9	36	16	64		

Discussion

As regards the mothers of preterm infants, the study results revealed that overall, the mothers in both groups, predominately, were: in their twenties; can read and write or secondary school graduates; and, housewives. There were no statistically significant differences between study and control groups in sociodemographic characteristics of mothers this indicated that both groups were homogenous before conduction of the educational program. Similarly, a study conducted by [5] to determine the knowledge and attitude of nursing staff and mothers towards kangaroo mother care in the eastern sub-district of Cape Town. Using A cross-sectional descriptive study on 30 mother having premature infants and six neonatal nurses, they found that, the mean age of the mothers was 26.9 ± 6.25 years and approximately 53% of mothers had not completed their secondary education.

It has been reported that mothers with preterm newborns possessed less maternal confidence and caring knowledge than those with full-term newborns. Therefore, building the maternal confidence of mothers of premature newborns can help them reduce the difficulties of caring for their infants after discharge from hospital [19]. The results of the present study were in accordance to the above mentioned empirical evidences and demonstrated that more than half of them had poor level of knowledge regarding care of preterm infant at home before program implementation, and there was no statistically significant difference between both groups. These results would indicate the urgent need for educating and instructing mothers how they provide adequate care for their preterm infants after hospital discharge.

After program implementation at 8th and 16th weeks after hospital discharge the highest percentage of the mothers in the study group had good level of knowledge and reported practice, and they gained higher mean scores regarding care of their infants than mothers in the control group. These findings indicate the effectiveness of the designed pre-hospital-discharge educational program on improving level of knowledge and practice among mothers in the study group. It also verifies the ability of the mothers to retain the acquired knowledge till 16th week after program implementation. The current study results support its first hypothesis.

Similarly, a study conducted by [20] to evaluate the effects of a researcher-developed transitional care program for mothers of premature infants on the mothers' transition from hospital to home. Participants included 72 mothers and 81 premature infants. They reported that mothers involved in the education program had increased knowledge

and skills about how to care for their fragile infants' needs, most likely assisted them in being better able to provide appropriate infant care.

As regards the characteristics of preterm infants in the study and control groups, the study results evident that the maximum percentage of them was males, and more than half of the infants their gestational age ranged from 32-33 weeks. Their birth weight was less than 1500 grams. A previous study by [19] to evaluate the effectiveness of structured discharge education on maternal confidence and caring knowledge and the growth of premature newborns have shown that, 79.3% and 56.7% respectively of premature infants in the study and control group were males. Their mean of gestational age as was 31.43 ± 3.41 and 31.9 ± 3.13 weeks respectively.

In an Egyptian study conducted by [21] to evaluate the effect of lateral versus supine position on Oxygen saturation among 100 preterm infants with RDS, they found that 64% and 60% respectively of preterm infants in the study and control group were males. The mean of their gestational age was 32.7±1.8 weeks and their mean of birth weight was 1.952±0.57 grams. Furthermore, [22] investigated 40 newborn infant in the NICU at Benha Specialized Hospital, Egypt and they found that 50% of them were males. In a recent Egyptian study by [23] to assess the

quality of nursing care provided for preterm infants with RDS. The study revealed that 59.2% of preterm infants were males, 64.8% of their GA ranged from 34-<37 weeks, and 77.5% of them had birth weight from 1500 to <2500 grams.

Approximately, 50% of the neonates born at 26-28 weeks of gestation develop RDS, whereas less than 30% of the preterm neonates born at 30-36 weeks of gestation develop the condition [24]. On the same context, [25] reported that the records of the Alexandria University Hospital in 2009 indicated that, RDS was the second main reason for admission to the NICU. The current study results were in accordance with the previously mentioned evidences and revealed that RDS was the chief diagnosis among the majority of preterm infants in both groups.

The vast majority of them in both groups were hospitalized in the NICU for more than three weeks. On the same line, [19] in their study found that the mean of the NICU stay among preterm infants was 31.07±26.35 day. Moreover, empirical evidence and previously cited research literatures by [12] commented that prolonged hospitalization has been associated with poorer parent–child relationships, failure to thrive, child abuse, and parental grief and feelings of inadequacy. The NICU environment of noise, bright light

and lack of day-night cycling can have adverse effects on infant growth and development.

According to somatic growth is an indicator of a child's health and nutrition. In Egypt, pediatricians can compare growth with local National Egyptian Growth Curves and WHO growth curves. [26]. The study results highlighted that, preterm infants in the study group gained weight and length with higher rate, and had appropriate head circumference than those in the control group and there was no statistically significant difference between the means of infants' weight in both groups. On the other hand, there was statistically significant difference between the means of infants' length in both groups. The study results were supported by [27] which documented that parental size and genetic inheritance has a direct influence on a child's growth potential and their predicted adult height; more so for height than weight. The current study results were in accordance with several previous studies by [19, 20] who have shown that infants in the experimental group having a greater gain in body length and weight than infants in the control group. None of the other growth indicators demonstrated a significant difference between the two groups at 8th week post-hospital discharge.

A burgeoning literature has demonstrated that vital signs are never stagnant, and are affected by a variety of internal and external factors, including many disease conditions, anxiety, pain, exercise, and even circadian and diurnal rhythms. The normal ranges of the vital signs are finely adjusted, and any deviation from normal may indicate disease [28]. The results of the current study were in accordance to the above mentioned evidences and showed that the vast majority of infants in the study group and the highest percentages of them in the control group had normal means of vital signs and there were statistically significant differences between the means of infants' vital signs in both groups.

Concerning the comparison between preterm infants in both groups according to their general health condition at 8th and 16th weeks after hospital discharge, the study results proved that the majority of infants in the study group were breast fed and they continued exclusively breast fed till 16th week. Unfortunately, 40% of infants in control group stopped breast feeding and totally dependent on the artificial formula. It could be due the mothers who participated in the program were sufficiently taught about the benefits of breast feeding for their infants, themselves and their families. According to [29] the early initiation of breastfeeding (within one hour of birth) among Egyptian mothers in rural areas was 59% and it decreased among urban mothers to 51%. Exclusive

breastfeeding is not universal in Egypt. Only 29% of children aged 4-5 months are exclusively breastfed.

Apparently, preterm infants, whose mothers had been involved educational program, had fewer physical illnesses (diarrhea, vomiting, diaper rash, fever) at 8 and 16 weeks after hospital discharge, than infants whose mothers were not involved in the program. These results could suggest that, the well instructed mothers will be able to provide appropriate infant care at home and this can lead to the presence of healthier infants who have a decreased incidence of physical illnesses. These findings support the second hypothesis of the current study. On the same line, [20] found that mothers who received the transitional care program had infants with significantly better health outcomes, one month after hospital discharge, than infants of mothers who had not received.

The current study results highlighted the positive effects of the training program on the basic developmental milestones among those infants' mothers who participated in the program. There was no statistically significant difference between infants in both groups concerning the gross motor milestones at 8 and 16 weeks after hospital discharge. However, there were statistically significant differences between premature infants in both groups concerning the fine motor, language,

and personal-social milestones the two time frames after hospital discharge.

Additionally, it was evident from the study results that infants in the control group showed a higher percentage of "suspect" delayed development than infants in the study group. These results partiality support the third hypothesis of the current study. It is possible that the variation between the developmental milestones among infants in both groups due to various factors which ultimately could have influenced the infants' growth and development. On contrary, [20] found no significant difference regarding their normal development between the premature infants in the experimental and control group at 8 or 16 weeks after hospital discharge.

Conclusion

The current study concluded that mothers who received the pre-hospital discharge educational program demonstrated significant higher mean score of knowledge and reported practice regarding care of their preterm infants after hospital discharge than those in the control group. Fortunately, infants whose mothers had been involved in the educational program had fewer physical illnesses (diarrhea, vomiting, diaper rash, fever) after hospital discharge, than infants whose mothers were not involved in the program. Simultaneously, the educational program was reflected positively on the basic

developmental milestones according to Denver Developmental Screening Instrument version II among infants of mothers in the study group. These results support the proposed study hypotheses.

Recommendations: Based on the current study results, it was recommended that:

- Supporting and involving parents in the discharge process is mandatory to give them confidence in caring for their preterm infant at home.

- There is a need to create educational activities based in active learning methodologies to meet the needs of health education of the family, empowering and enhancing their autonomy.

- The neonatal nurses must ensure that an appropriate follow-up plan is in place before discharge and that all aspects of the plan should be communicated and understood by the parents.

- A more comprehensive longitudinal study is needed to evaluate the long-term effect of discharge educational program on the growth of preterm newborns in the future.

- Future research studies need to consider replicating this study in a variety of NICUs addressing the factors influencing the delivery of adequate and appropriate care after the preterm infant is discharged from the hospital.

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