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Effect of mothers' empowerment program on premature infants' attachment and weight gain

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Abstract

Empowerment program help mothers to increase readiness of weight gain and attachment for premature infants after discharge which in turn are a critical issue to decrease potential adverse consequences. Aim of the current study was to evaluate the effect of mothers' empowerment program on premature infants' attachment and weight gain. In order to represent the current research, the design of quasi-experimental was implemented. The study was conducted at Center for Social and Preventive Medicine in premature outpatient clinic in the Cairo University Specialized Pediatric Hospital (CUSPH). A convenience sample of 60 premature infants and their mothers was participated in the current study; mothers and their preterm infants were split into two equal groups: 30 as a control group and 30 as a study group. The data was collected using the following tools: a structured interview questionnaire sheet, mother's knowledge assessment questionnaire (pre/posttest), practices observational checklists, maternal postnatal attachment scale and standardized weight growth chart. The results revealed that, the mothers in the study group who received empowerment program had a higher overall mean score of knowledge and practices rather than mothers in the control group. There were statistically significant differences were detected for infant's weight in the study group before and after empowerment program rather than infants in the control group. As well as, there were statistically significant differences were detected for attachment scale in the study group before and after empowerment program rather than a control group. As well as the mothers who received the empowerment program there were increased weight and attachment for their premature infants.

Keywords: Empowerment program, mothers, premature infants, weight gain, attachment

1. Introduction

Prematurity defined as birth prior to 37 weeks' gestation and have low birth weight below 2.500gm with a greater risk of neuropsychomotor development delay. More attention should be considered to growth and development of premature infants [1]. Infants begin their lives in the highly mechanical environment of a Neonatal Intensive Care Unit (NICU). A premature infant is also traumatizing for the parents because of uncertainty about both their infant's survival and the impact of premature birth [2].

Many infants are discharged from hospital while they need more care in home and accurate follow-up. Therefore, it is necessary to design appropriate healthcare programs before transferring to home [3]. Measuring growth rate in preterm infants is of crucial importance because poor growth is associated with severe long-term outcomes [4].

Premature infant are at risk for poor growth while in NICU and after discharge. They must be closely monitored to promote better growth [5]. A premature infant is already underweight and further loss of weight can be dangerous, especially since their rate of gaining weight is also slower than full term infants, just about 5 grams a day [6].

Feeding pattern for preterm infant is to provide nutrients to meet the growth rate parameters. Failure to provide the necessary amounts of feeding to preterm infants can produce failure of growth and increased morbidity rate [7]. Mothers of preterm infants are less likely to breastfeed than mothers of healthy term infants. Family members and health care professionals sometimes discourage these mothers from initiating lactation for strengthening the immune system of their infants [8].

Exclusive breastfeeding (EBF) for the first 6months of life, recent report states that only 24.9% of mothers reach this goal and the vast majority of infants are bottle-feed. 14.6% of all infant born globally from 2015 to 2019 suffered from low birth weight and higher risk of stunted growth [9]. Mothers of preterm infants have less confidence in their parental role and they must adapt themselves to infants who need special care. There is an agreement on parents' need to be supported by careers in order to improve the infant care and infant

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parent's relationship [10].

Attachment is the emotional bond that develops between infants and their caregivers in early infant life and not sufficiently attachment established can show a variety of infant problems. The recent studies concentrate on mother infant attachment for normal infant growth and development [11]. Preterm infant attachment seems to be stronger with caregivers. Majority of studies describe developmental issues as the base for potential problems in mother attachment with their infant [12].

Infant's attachment is provided through continuous interaction with the environment which includes family, social interaction, and preliminary care. The transition from hospital to home in preterm infants is a critical period for parents to strengthen the relationship with their infants [13]. Education and empowering the mothers during follow up help them not only to cope with their infants, but also enable them to give home care to their infants. Plan of mothers' education is to promote their independency and nurses are responsible for supporting, educating, and enhancing mothers coping with their infant [14]. Provide an educational program for mothers before discharge for increase their knowledge [15].

Empowerment is upheld as a creative strategy to provide high quality of care across a family-centered care approach. On the other hand, teaching them the needed skills that offering and providing them with the support services they need. The mothers no longer play a passive role in the line of their infant care; they become actively involved in the line of management and taking responsibility to care of their infants [16].

1.1 Significant of the study
The risk of infant mortality among low birth weight infant examined by [17], they used survival regression analysis on 11361 infant in the 5 years preceding the 2013 Egypt Demographic and Health Survey and found that infant living in urban area and Upper Egypt rural region were associated with higher mortality rate in low birth weight infant [18]. They found have higher morbidity and mortality rates than preterm infants due to their relative physiologic, metabolic immaturity and often the size and weight [19]. The percentage of preterm in six countries namely Cuba, Hungary, New Zealand, Sweden, Australia and Japan rated 10.5%, 19.5%, 4%, 4.5%, 10.5% and 2.5% respectively. In Egypt, data regarding the incidence of preterm is lacking due to poor recording system. Premature infants are liable to many problems either on the short term or on the long term. The importance of this study was improved mothers' knowledge and practices to increase their infant's weight and attachment as well as was integrated the empowerment program inside the NICU.

In Egypt, there are scarce studies conducted in the field of empowerment program for mothers of premature infants to provide care for their infant. Hence, the current study was undertaken to evaluate the effect of mothers' empowerment program on premature infants' attachment and weight gain. Hopefully, this empowerment program could help improving mother's knowledge and practice regarding care of their infant to improve their weight gain and increase attachment between mothers and their infant. Moreover, providing guidance and recommendations that should be reflected in pediatric nursing education and provide evidence based data that can develop nursing practice and

research in the field of neonatology.

1.2 Operational definitions
1.2.1 Empowerment program
In the current study it refers to empowerment educational interventions about attachment during care and feeding pattern provided for the mothers having premature infant to improve attachment with their infant and increase their weight gain through providing safe and accurate care for their preterm infant. Empowerment program it was prepared after extensive literature review which included two sessions. The first session integrated information about importance of breast feeding, sterilization of bottle, preparation of formula, breast feeding techniques, infant care (bathing, diaper). The second one which included mother's practices were performed through using observational check list for breast feeding, bottle feeding, sponge bath, diaper care and enhancing touch to developed sensor stimulation with their infant to increase attachment were performed through maternal postnatal attachment scale (MPAS).

1.3 Aim of the study
The aim of the current study was to evaluate the effect of mothers' empowerment program on premature infants' attachment and weight gain

1.4 Research Hypotheses
1. Mothers of premature infants who will receive the empowerment program in the study group will have higher total mean score of knowledge and practices than those in the control group.
2. Premature infants of mothers who will receive the empowerment program in the study group will have more weight again than those in the control group.
3. Premature infants of mothers who will receive the empowerment program in the study group will have satisfactory attachment with their mothers than those in the control group.

2. Materials and Methods
2.1 Research design
Quasi –experimental research design was utilized to achieve the aim of the current study. A quasi experimental design is one type of experimental design that is very similar to the true experimental design except there is losing one criteria as randomization [20].

2.2 Setting
The study was conducted at the Center for Social and Preventive Medicine in premature outpatient clinic in first floor during follow-up at Cairo University Specialized Pediatric Hospital (CUSPH). The clinic receives premature infants after discharge from NICU for health screening every two weeks.

2.3 Sample
A convenience sample of 60 premature infants and their mothers was coming to follow up clinic over 6 months period and fit with the study's inclusion criteria. This sample was divided into two equal groups, control group was received the mother's routine of care and the other group was subject to the empowerment program (study group).

2.4 Ethical Considerations

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 they have the right to withdraw from the study at any time without any effect on their infants care. For research ethical consideration data was collected firstly from the control group then the study group.

2.5 Data collection tools

The required tools were developed after reviewing the related recent literature:

2.5.1 A structured Interview sheet (tool 1)

It included personal data for the mother and premature infant: it involved eleven 11 questions. Five (5) questions about mothers as: age, level of education, occupation, place of residence, cause of preterm delivery. Also it included five (5) questions about characteristics of infant such as age, gender, diagnosis, admission duration in NICU, weight at birth.

2.5.2 Mother's Knowledge Assessment Questionnaire (pre/posttest) (tool 2)

It included twenty-seven (27) questions about knowledge as technique of breast feeding (6 questions), sterilization of bottle feeding (6 questions), preparation of formula feeding (5 questions), formula feeding techniques (6 questions), hygienic care which include bathing and diaper (4 questions).

2.5.3 Practices observational checklists (tool 3)

It included forty four (44) and adapted from [21] it was modified and simplified by the researcher to fit the capabilities of mothers to evaluate the mothers' practice regarding infant feeding pattern (breast feeding techniques, bottle feeding techniques) which included eighteen (18 item) and hygienic care (sponge bath, diaper care) which included twenty six (26 item).

2.5.4 Maternal Postnatal Attachment Scale (MPAS) (tool 4): adapted from [22]. It involved nineteen (19) questions to assess mothers and their infant attachment will be completed by the researcher from mothers. The MPAS is designed for those within the age range of birth to 36 months and is administered to the mother. It has 3 subscales and 19 items. Items in brackets are reversely scored including the first subscale for quality of attachment which included 9 items (3, 4, 5, 6, (7), (10), (14), 18 & 19 questions number). The second subscale for absence of hostility which integrated 5 items (1, 2, 15, 16 & 17 question number) and the third subscale for pleasure in interaction which included 5 items all reversed score (8, 9, 11, 12 & 13 number question).

2.5.5 Standardized Weight Growth Chart (tool 5)

It was adopted from National Center for Health Statistics in collaboration with the [23] to assess infant weight (boys and girls) from birth to 36 months by plotting on the growth curve.

2.6 Scoring system

For mothers' knowledge and practices; each correct response took "2" scores, the incomplete response took one "1" score and the wrong response or the don't known took "zero" score. The total score of knowledge was 54 for twenty seven (27) questions and the total score of practices was 88 for forty four (44) questions. Score was converted to 100%, and then categorized as following: the total score less than 50% (less than 27 score for knowledge and 44 score for practices) was considered as unsatisfactory level while score of 50% and more (27 score and more for knowledge, 44 score and more for practices) was considered as satisfactory level.

For maternal postnatal attachment scale (MPAS):- it is scored based on the likert scale. To ensure equal weighting of all questions, response options will be recoded to represent a score of 1 (low attachment) and score of 5 (high attachment) for every question. Moreover, the score of 1st subscale equal 45; score for 2nd subscale equal 25 and 3rd subscale equal 25. The total attachment score for 3 subscales equal 95 and was considered low attachment equal 19 and high attachment 95.

2.7 Validity and reliability

Data collection tools of the study were given to a group of 5 experts in the field of pediatric neonatology and pediatric nursing to test the content validity of the tools. Reliability of tools was performed to confirm (tools 1, 2, 3) consistency using Cronbach's alpha was 0.80 and The reliability of MPAS (tool 4) by Cronbach's alpha > 0.70 referenced by [24].

2.8 Procedure

Official permissions were obtained from the directors of Center for Social and Preventive Medicine at Cairo University Children Hospital (CUCH) and permission from the head of outpatient clinic in first floor was obtained. Mothers and their infants who meet the inclusion criteria were invite to participate in the study. The purpose and the nature of study were explained to each mother individually. An individual interview were conducted with each mother in the control and study groups to take personal data for her and her infant (tool 1) and pretest obtained by the researcher to assess mothers' knowledge and practice (tool 2, 3) in waiting room. Then the researcher was assessing mother's attachment with their infant through (tool 4) and measured their infant weight for both study and control group within 30 minutes for on individual basis. Then, the researcher was conducting the empowerment program for mothers in the study group at two sessions (each one is 30-45 minutes) on individual basis and sometimes for a group of mothers ranged from 3 to 5 mothers. The first session included information about importance of breast feeding, sterilization of bottle, preparation of formula, breast feeding techniques, infant care (bathing, diaper). The second one which included mother's practices were performed through using observational check list for breast feeding, bottle feeding, sponge bath, and diaper care.

Then the practical practice sessions was aided by using videos and illustrated pictures about pattern of feeding and infant care. Demonstration and re-demonstration of practice on a doll; were used to master the required skills. After two weeks the researcher was fill out posttest for study group to assess mothers' knowledge and practice and after one month were assess mother's attachment with their infant after receiving empowerment program (tool 4). As regarding to control group the researcher completed posttest tools to

assess mothers' knowledge and practice and mothers attachment after receiving routine care during follow up in outpatient clinic in the same time as the study group. Similarly, in the follow up for infants in both groups the researcher was measure weight after one month; the researcher was assess weight for infants by using basket infant weighing scale. The scale measuring in 20kg graduations was used. It is recommended for weighing infants from birth to 2 years and Accuracy and precision at significantly ($p<0.05$) referenced by [25]. Data collection was conducted over eight months extending from February 2021 till November 2021.

2.9 Statistical Analysis
The collected data tabulated, and summarized. By using a statistical package for social studies (SPSS) version 20 was used for statistical analysis of data. Data was computerized and analyzed using appropriate descriptive and inferential statistical tests. Qualitative data were expressed as frequency and percentage. A comparison between qualitative variables carried out by using Chi square test. Comparison of means was performed using t-test. The level of significance at $p<0.05$ and $p<0.01$ were used as the cut of value for statistical significance.

3. Result

Table 1: Percentage Distribution of Characteristics of Premature Infants' in the Study and Control Group

Items	Study group (n=30)		Control group (n=30)	
	N	%	N	%
Infants age after birth (weeks)				
>2weeks	0	0	6	20
2> 4weeks	14	46.7	9	30
4>6weeks	12	40	9	30
6 and more	4	13.3	6	20
Mean ±SD (days)	29.2	3± 6.79	27.16 ±7.12	
Gender				
Male	17	56.7	20	66.7
Female	13	43.3	10	33.3
Diagnosis				
RDS	7	23.3	6	20
LBW	8	26.7	6	20
RDS and LBW	15	50	18	60
NICU duration				
2weeks	15	50	16	53.3
3 weeks	12	40	9	30
4weeks	3	10	5	16.7
Weight at delivery				
> 1500 g	2	6.7	3	10
1500 > 2000 g	16	53.3	15	50
2000 g and more	12	40	12	40

RDS = respiratory distress syndrome   LBW = low birth weight

Table (1) revealed that more than two fifth (46.7%) of premature infants participated in the current study and one third of premature infants in the control group their age was from 2>4 weeks. The mean age was 29.23±6.79 days for premature infants in the study group and 27.16±7.12 days for them in the control group. More than half (56.7%) of the study group children and More than two thirds (66.6%) of the control group were males. It was found that, 50% and 60%, respectively of premature infants in the study and control groups' diagnosis was RDS and LBW. The same table reflected that 50% and 53.3%, in order of premature infants in the both groups were staying 2 weeks in NICU. The current study result indicated that more than half 53.3% of premature infants in the study group and half (50%) of them in the control their weight at delivery less than 2000 gram and two fifth for the both group their delivery weight 2000 gram and more.

Table 2: Percentage Distribution of Mothers Personal Data in the Study and Control Group

Items	Study group (n=30)		Control group (n=30)	
	N	%	N	%
Mothers age/years				
>20	5	16.7	6	20
20>30	13	43.3	13	43.3
30 >40	10	33.3	10	33.3
>40 and more	2	6.7	1	3.3
Mean ±SD	27.7+6.74		27.5+ 7.53	
Mother's level of education				
Can read/write	10	33.3	14	46.7
Primary &preparatory school diploma	4	13.3	4	13.3
	16	53.3	12	40
Mother's job				
Housewife	19	63.3	26	86.7
Working mother	11	36.7	4	13.3

Place of residence				
Rural	14	46.7	19	63.6
Urban	16	53.3	11	36.7
Causes of deliver preterm infant				
Preeclampsia	7	23.3	6	20
Bleeding	8	26.7	6	20
Preterm rupture of member	15	50	18	60
Way of feeding				
Breast feeding	3	10	5	16.7
Bottle feeding	13	43.3	15	50
Both feeding (breast & bottle)	14	46.6	10	33.3

Table (2) clarified that 43.3% respectively in both group of mothers their age ranged from 20 to less than 30 years. The mean age was 27.7 ± 6.74 years for mothers in the study group and 27.5 ± 7.53 of them in the control group. Regarding mothers' level of education, it was found that (53.3% & 40% respectively) in the both study and control group had diploma education. In relation to their occupation, it was found that, (63.3% & 86.7% respectively) of mothers in both groups were housewives and more than half in study group from urban area compared to 63.6% of them in control group from rural region. Regarding to causes of deliver preterm infant (50% and 60% respectively) of mothers in the study and control group had preterm rupture of membrane. More than two fifth of mothers in the study group was used bottle feeding and combination feeding compared to half of them in control group gave bottle feeding.

Table 3: Comparison between Total Mean Score of Mothers' Knowledge before rand after Empowerment Program in the Study and Control Group

Items	Study group (n=30)		T	P	Control group (n=30)		T	P
	Before	After			Before	After		
	Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Techniques of Breast feeding (12 marks)	5.30±.876	10.20±1.21	-16.29	.000*	4.73 ±1.01	5.36 ±.927	-2.35	.026
Sterilization of bottle feeding (12 marks)	4.46±1.33	10.26±1.17	-19.78	.000*	4.70±1.26	4.73±1.17	-.107	.916
Preparation of bottle feeding (10 marks)	3.90±1.06	7.33±1.26	-12.52	.000*	3.90±1.15	3.93±1.01	-.117	.908
Techniques of bottle feeding (12 marks)	5.23±1.04	10.16±1.26	-16.08	.000*	4.23±1.33	5.03±1.18	-2.22	.034
Routine care (8 marks)	3.20±1.06	6.80±.761	-13.35	.000*	3.06±.980	3.43±.935	-1.48	.148

** Significant at *p*<0.01

Table (3) highlight that, the total mean scores of mother's knowledge in study group before empowerment program were 5.30±.876, 4.46±1.33,3.90±1.06, 5.23±1.04, 3.20±1.06 respectively compare to the total mean scores of mothers knowledge after empowerment program for study group increased to 10.20±1.21, 10.26±1.17, 7.33±1.26, 10.16±1.26, 6.80±.761 respectively. Regarding to mothers knowledge in control group before and after empowerment program were nearly scored to each other. Although, there were statistically significant differences were detected between total mean score of mother's knowledge in the study group before and after empowerment program at (*p*<0.01). There were no statistically significant differences were detected between the total mean score of mother's knowledge in the control group.

Table 4: Comparison between Total Mean Score of Mothers' Observational Checklists Practices before and after of empowerment program in the Study and Control Group

Items	Study group (n=30)		T	P	Control group (n=30)		T	P
	Pre-test	Post-test			Pre-test	Post-test		
	Mean ± SD	Mean ± SD			Mean ± SD	Mean ± SD		
Breast feeding (14 marks)	5.40±.968	11.23±1.50	-15.56	.000*	5.66±.922	5.26±.907	1.64	.110
bottle feeding (22 marks)	12.96±1.77	18.06±1.68	-11.86	.000*	10.60±1.45	12.90±1.51	-6.58	.075
Sponge bath (34marks)	18.76±1.99	28.90±2.86	-15.14	.000*	16.10±1.93	18.16±2.15	-5.23	.064
Diaper care (18 marks)	9.00±2.30	14.60±2.25	-8.35	.000*	8.80±2.15	8.90±1.97	-.242	.811

**Significant at *p*<0.01

It was clear from table (4) that the total mean scores of mother's practices in study group before empowerment program were 5.40±.968, 12.96±1.77, 18.76±1.99, 9.00±2.30 respectively compare to the total mean scores of mothers practices after empowerment program for study group increased to 11.23±1.50, 18.06±1.68, 28.90±2.86, 14.60±2.25 respectively. Regarding to mothers practices in control group before and after empowerment program were nearly scored to each other. Although, there were statistically significant differences were detected between total mean score of mother's practices in the study group before and after empowerment program at (*p*<0.01).

Table 5: Comparison between Mothers Level of Knowledge and Practices before and after of empowerment program in the Study and Control Group

Item	Study group (n=30)				X²	P	Control group (n=30)				X²	P
	Before		After				Before		After			
	No	%	No	%			No	%	No	%		
Satisfactory	8	26.7	27	90	19.2	.000*	9	30	11	36.7	6.9	.144
Unsatisfactory	22	73.3	3	10			21	70	*19*	63.3		

Significant at *p*<0.01

Table (5) indicated that, 73.3 %of mothers had an unsatisfactory level of knowledge and practices in the study group before of empowerment program compared to majority of mothers had a satisfactory level of knowledge and practices after of empowerment program. On the same line, (70 %, 63.3% respectively) of mothers had an unsatisfactory level of knowledge and practices in the control group. Statistically significant differences were detected in the study group between mothers' level of information and their practices before and after of empowerment program at (*p*<0.01).

Table 6: Comparison of the Means of Infant Weight before and after Empowerment Program in Study and Control Group

Items	Study group (n=30)	T	P	Control group (n=30)	T	P
	Mean ± SD			Mean ± SD		
Before	2.248±.078	-25.39	.000*	2.104±.092	-13.56	.070
After	2.570±.072			2.350±.102		

**Significant at *p*< 0.01

Table (6) Illustrated that there was a statistically significant difference in the study group between the infant weight before and after empowerment program at (t= -25.39, p=<.000). There were no statistically significant difference in the control group the infant weight at (t= -13.56, p=<.070).

Table 7: Comparison between Total Mean Score of Infant Weight Gain before and after of Empowerment Program in Study and Control Group

Item	Study group (n=30)				T	P	Control group (n=30)				T	P
	Before		After				Before		After			
	No	%	No	%			No	%	No	%		
100>150g	15	50	3	10	23.35	.000*	13	43.3	14	46.7	19.60	.061
150>200g	8	26.7	7	23.3			10	33.3	10	33.3		
200 > 250g	5	16.7	13	43.3			4	13.3	5	16.7		
250 to 300	2	6.7	7	26.6			3	10	2	6.7		
Mean ± SD	159.1± 45.6		219.6±51.5				158.8±44.3		163.1±48			

**Significant at *p*<0.01

Concerning the total mean score of infant weight gain before and after of empowerment program in the study and control group, it was clear from the table (7) that there was difference between Mean ± SD of infant weight gain before and after in the study group (159.1± 45.6, 219.6±51.5 respectively) compare to control group the Mean ± SD of infant weight gain before and after (158.8±44.3, 163.1±48 respectively). There was a statistically significant difference in the study group before and after empowerment program at (t= 23. 35, p=<.000) and there were no statistically significant difference in the control group at (t= 19.60, p= <. 061).

Table 8: Comparison between Infants Weight on Growth Chart before and after of Empowerment Program in Study and Control Group

Items	Study group (n = 30)				X2	P	Control group (n = 30)				X2	P
	Before		After				Before		After			
	No	%	No	%			No	%	No	%		
Appropriate weight	12	40	23	76.7	6.53	.011*	10	33.3	13	43.3	.290	.590
Small weight	18	60	7	23.3			20	66.7	17	56.7		

*Significant at *p*<0.05

It was evident from table (8) that two fifth (40%) of infants in the study group before empowerment program had appropriate weight compare to 60% of them was small weight on the growth chart. On the other hand, More than three quarters of infants after empowerment program had appropriate weight and only 23.3% was small weight on the growth chart. (33.3%, 43.3% respectively) of infants in the control group before and after had appropriate weight and (66.7%, 56.7% respectively) of them were small weight on the growth chart. There were statistically significant differences for infants weight before and after empowerment program in the study group (X2= 6.53, p=.011) and there were no statistically significant differences for infants weight in the control group (X2=.290, p=.590).

Table 9: Comparison between Total Mean Score of Maternal Attachment Scale before and after of Empowerment Program in Study and Control Group

Items		Study group (n = 30)				T	P	Control group (n = 30)				T	P
		Before		After				Before		After			
		L	H	L	H			L	H	L	H		
Quality of attachment	NO	25	5	3	27	-8.93	.000*	26	4	23	7	-.902	.375
	%	83.3	16.7	10	90			86.7	13.3	76.7	23.3		
	Mean± SD	15±13.64		41.40±10.98				13.96±12.63		17.68±15.67			
Absences of hostility	NO	22	8	2	28	-8.22	.000*	20	10	20	10	.328	.745
	%	73.3	26.7	6.7	93.3			66.7	33.3	66.7	33.3		
	Mean± SD	10.33±8.99		23.66±6.07				11.89±9.67		11.89±9.67			
Pleasure of interaction	NO	19	11	4	26	-6.15	.000*	21	9	22	8	.297	.769
	%	63.3	36.7	13.3	86.7			70	30	73.3	26.7		
	Mean± SD	12.33±9.80		22.33±6.91				11.20±9.41		10.51±9.09			

**Significant at *p*<0.01   L = Lower   H = Higher

Table (9) indicted that, the total mean scores of maternal attachment scale in the study group before and after empowerment program regarding to quality of attachment were (15±13.64, 41.40±10.98 respectively), absences of hostility was (10.33±8.99, 23.66±6.07 respectively) and pleasure of interaction were (12.33±9.80, 22.33±6.91 respectively). There were statistically significant differences were detected before and after empowerment program in the study group at (p=<0.01). On the other hand, the total mean scores of attachment scale in the control group before and after empowerment programmer regarding to quality of attachment were (13.96±12.63, 17.68±15.67 respectively), absences of hostility was (11.89±9.67,11.89±9.67 respectively) and pleasure of interaction were (11.20±9.41, 10.51±9.09 respectively). No statistically significant differences were detected before and after empowerment program in the control group.

Table 10: Correlation between Maternal Postnatal Attachment Scale and Infants Age, Sex and their Weight Gain after the Empowerment Program in Study and Control Group

Items	Maternal Postnatal Attachment Scale			
	Study Group (n=30)		Control Group (n=30)	
	R	P	R	P
Age	.239	.038*	.053	.390
Sex	-.111	.280	.291	.439
Weight gain	.483	.003**	.216	.126

** Correlation is significant at *P*<0.05

It is evident from table (10) that, there were statistically significant correlation between maternal postnatal attachment scale and age, weight gain among infants in the study group after empowerment program at p=< 0.05. There were no statistically significant correlations between ages, sex and weight gain with maternal postnatal attachment scale among infants the control group.

4. Discussion
Concerning the personal data, it was evident from the current study's results that, more than two fifth of premature infants participated in the current study and one third of premature infants in the control group their age was from 2>4 weeks. The same result was founded by [26] they reported that, the preterm infant's age was from two to three weeks after discharge from NICU and need to follow up frequently within first 6 months of life [27]. They studied post-discharge follow-up of preterm infants and concluded that, the first visit occurred at two to three days after the discharge and the infant's age 6 weeks is a crucial need for special care. The current study revealed that, more than half of the studied children and more than two thirds of the control group were males. This result congruent with [28] they found that more than two thirds of preterm infant's admissions were male.
Regarding to child's diagnosis it was found that, half and less than two thirds respectively of premature infants in the study and control groups' diagnosis with RDS and LBW.

These results were congruent with [28] they found that the preterm births were an important cause for admissions in neonatal unit respiratory distress syndrome, sepsis and jaundice. Furthermore, the results showed that, half and more than half in order of premature infants in the both groups were staying 2 weeks in NICU. The results agreement with [29] they studied the impact of a preterm baby arrival in a family and emphasis that, majority of premature infants had to stay at the hospital for less than a month.
In relation to delivery weight, according to the current study results it was found that more than half and half respectively of premature infants in the study and control group their delivery weight less than 1500 gram and two fifth respectively for the both group their delivery weight was 2000 gram. This result was contrasted with [30] and documented that; majority of premature infants weigh during delivery was less than 2,500 grams.
In relation to mothers' age, according to the current study results it was found that less than half respectively in both study and control group of mothers their age ranged from 20 to less than 30 years. The mean age was 29.7 ± 6.74 years for mothers in the study group and 27.5 ± 7.53 of them in the control group. In this context, [31] they found that, almost of the mothers were belonging to the age group 20 to 30 years had preterm infant. In addition, [10] they studied sample consisted of 140 mothers and their mean age of 27.1±5.7. It could be related to the young age marriage in

some areas and lack of follow-up during pregnancy period.

The current study's results reported that more than half and two fifth respectively in both study and control group had diploma education. These findings were in agreement with [32] they found that, mothers who had below secondary level education had a four times higher risk of delivering a preterm baby. The literature has revealed significant associations between low maternal education and the risk of poor neonatal health outcomes. It could be interpreted as the mother's level of education play a major role to enhancing preterm infant health outcome.

In relation to mothers' occupation, less than two thirds and majority respectively of mothers in both study and control group were housewives and more than half in study group from urban area compared to less than two thirds of them in control group from rural region. These findings were consistent with [33] they studied the effect of mothers' empowerment program on premature infants' weight gain and duration of hospitalization and concluded that, the most of the mothers were housewives and majority of them live in rural place.

Regarding to causes of deliver preterm infants, half mothers in the study group and less than two thirds in the control had preterm rupture of membrane, this result congruent with [34] they reported that, majority of the mothers were delivered in 32 gestational weeks from premature rupture of membrane, preeclampsia and diabetes. In relation to way of feeding more than two fifth of mothers in the study group were give bottle feeding and combination feeding compared to half of them in control group was give bottle feeding. This result agreement with [35] they emphasis that, caloric requirements are around 85-95 kcal/kg/day for infants and recommended that the breastfeed is known to improve nutritional, immunological and developmental outcomes.

In relation to the total mean scores of mother's knowledge post empowerment program increased to 10.20±1.21, 10.26±1.17, 7.33±1.26, 10.16±1.26, 6.80±.761 respectively in the study group. This explanation was consistent with [31] they studied mothers' knowledge of health caring for premature infants after discharge from neonatal intensive care units and found that, the mean overall percentage of mothers' knowledge increased after nursing instruction before discharge from their infants from NICU.

On the other hands, there were statistically significant differences were detected between total mean score of mother's knowledge in the study group before and after empowerment program at (p<0.01). [36] they studied sample consisted of 120 mothers of preterm neonates and reported that, more than half of mothers of premature infants had increased in knowledge about infant weight gain showed at P<0.001.

Regarding to mothers level of knowledge, majority of mothers had a satisfactory level of knowledge and practices after of empowerment program in the study group and statistically significant differences were detected in the study group between mothers' level of knowledge and their practices before and after of empowerment program at p<0.01. These findings were consistent with [37] they studied newborn care practices at the Kenyatta National Hospital and they found that, the majority of mothers who received health teaching about infant care had satisfactory level regarding their knowledge at p<0.05.

It was found from the current study that there were statistically significant differences detected between total

mean score of mother's practices in the study group pre and post empowerment program at (p<0.01). This result congruent with [38] who found mothers support from healthcare provider and education can improve mothers confidence and infants care at p<0.05.

The results indicated that there was a statistically significant difference in the study group between the infant weight before and after empowerment program at t= -25.39, p=<.000. This result congruent with [10] they studied the effect of empowerment program on mother-infant interaction and weight gain in preterm infants and showed that, there was statistically a significant difference in infants weight before and after empowerment program at p= 0.001.

The current result concluded that there was a statistically significant difference in the total mean score of infant weight gain in the study group at t= 23. 35 p=<.000 and there were no statistically significant difference in the control group at t= 19.60 p=<.061. this agreement with [39] and documented that, three quarters of infants born preterm had a higher percentage of rapid weight gain in the first four months of life relative to less than one third of full term infants at r = 0.81 p<0.001.

It was evident from the current study results that there were statistically significant differences in infant weight in the study group after empowerment program at X2= 6.53 p=.011. In agreement with [40] they studied that promoting maternal interaction improves growth and found that, the intervention to teach mothers of preterm infants to increase abilities for interact and improve weight gain for their infants at p<0.05.

It was evident from the current study results that, there were statistically significant differences were detected between attachment scale before and after empowerment program in the study group at p=<0.01. This result was agreement with [10] they reported that, the majority of mothers who received health education had adequate knowledge about essential preterm care and the total mean of maternal attachment behaviors in the experimental groups at p=0.001. On the other hand, this result congruent with [41] documented that, the prevalence of postnatal depression was two fifth between mothers aged 35–39 years had lower scores on two of the maternal attachment subscales for quality of attachment and absence of hostility at p<0.001.

There were statistically significant correlation between maternal postnatal attachment scale and age, weight gain among infants in the study group after empowerment program at p=< 0.05. This result was congruent with [42] they reported that, infants' weight growth in the experimental and comparison groups in the attachment programs was found statistically significant difference at p = 0.002 in infant weight growth between the two groups. On the other hand, [43] emphasis that preterm infants who born at a gestational age of less than 37 weeks and weighing less than 2500g and admitted to the NICU need to attachment program for enhancing weight gain [44]. This study's results demonstrated that attachment program in NICU had a significantly affect on infants' weight gain.

5. Conclusion

The current study results concluded that mothers of preterm infants who received empowerment program had higher mean score of knowledge and practice regarding feeding and care for their children than before. Infants who cared by mothers after receiving the empowerment program were

increased weight gain and attachment scale to their infants than those in the control group. The study assured that the implementation of empowerment program were effective in enhancing mother's pediatric knowledge and improve their practices while caring their infants after discharge from NICU.

6. Recommendations
- Integration and implementation the empowerment program for mothers before discharge their infants from NICU are essential.
- An educational program for mothers to enhancing care for their infants after discharge is crucial.
- Longitudinal study is necessary to monitor preterm infant's growth parameters.
- Replication of study on larger sample to generalized results.

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8. References
1. Souza A, Tavares A, Carvalho D, Araújo V. Weight gain in newborns submitted to skin-to-skin contact. CEFAC. 2018 Jan-Feb;20(1):53-59.
2. Mathew G, Gupta V, Santhanam S, Rebekah G. Postnatal weight gain patterns in preterm very-low-birth-weight infants born in a tertiary care center in South India. Journal of Tropical Pediatrics. 2018;64:126-131.
3. Moradi S, Bostanabad MA, Seyedrasooli A, Tapak L, Valizadeh S. The effect of empowerment program on maternal discharge preparation and neonatal length of hospital stay: a randomized controlled trial. Iranian Journal of Nursing and Midwifery Research. 2018;5:IP: 109.60.246.81.
4. Fenton T, Chan H, Madhu A, Ian J, Griffin M, Angela D. Preterm Infant Growth Velocity Calculations: A Systematic Review Pediatrics, 2020. Available at: https://pediatrics.aappublications.org/
5. Fenton TR, Anderson D, Groh-Wargo S. An Attempt to Standardize the Calculation of Growth Velocity of Preterm Infants-Evaluation of Practical Bedside Methods. J Pediatric. 2018;196:77.
6. Islami Z, Fallah R, Mosavian T, Pahlavanzadeh M. Growth parameters of NICU admitted low birth weight preterm neonates at corrected ages of 6 and 12 month. Journal List Iran J Reprot Med, 2019, 10(5).
7. William W, Hay J. Nutritional Support Strategies for the Preterm Infant in the Neonatal Intensive Care Unit. Journal of Pediatric Gastroenterology Hepatology and Nutrition. 2018;21(4):234-247.
8. Vickers AM, Starks-Solis S, Hill DR, Newburg DS. Pasteurized Donor Human Milk Maintains Microbiological Purity for 4 Days at 4 °C. J Hum Lactation. 2019;31(3):401-405.
9. Centers for Disease Control and Prevention. Breastfeeding report card United States, 2018. Avalible at: https://www.cdc.gov/breastfeeding/pdf/
10. Borimnejad L, Mehrnush N, Seyed-Fatemi N, Haghani H. The Effect of Empowerment Program on Mother-Infant Interaction and Weight Gain in Preterm Infants.

Zahedan Journal of Research in Medical Sciences. 2020;14(9):19-23
11. Cassidy J, Shaver P. Handbook of attachment: Theory, research, and clinical applications. (3rd ed). New York, 2018, 145-149.
12. Ruiz N, Piskernik B, Witting A, Fuiko R, Ahnert L. Parent-child attachment in children born preterm and at term: A multigroup analysis. Journal List PLoS One, 2019, 13(8).
13. Hasanpour S, Ouladsahebmadarek E, Hosseini M, Mirghafourvand M, Heidarabadi S, Jafarabadi M. Mother-infant attachment at the age of 1 year in recipients of developmental care after preterm birth. International Journal of Women's Health and Reproduction Sciences. 2018;6(1):90-96.
14. Ghoneim AA. Health promotion toolkit: an approach for empowering families caring for children with developmental disabilities in Tabuk. Journal of Medical Sciences. 2018;6(8):1503-1511.
15. Ali R, Obeisat S, Tarawneh L. Improving nursing knowledge and care for neonates with respiratory distress in Jordan. International Nursing Review. 2019;66(3):338-345
16. Arief YS, Nursalam N, Ugrasena DG, Devy SR, Savage E. The development of model family-centered empowerment on caring for children with leukemia. Journal Nurses. 2018;13(1):98-105.
17. Hong R, Ruiz-Beltran M. Low birth weight as a risk factor for infant mortality in Egypt. Eastern Mediterranean Health Journal, 2019, 14(5).
18. Huff K, Rose RS, Engle WA. Late preterm infants: morbidities, mortality, and management recommendations. Pediatric Clin J. 2019;66(2):387-402. https://doi.org/10.1016/j.pcl..12.008
19. ELhawary M, Elgameel E, Amin S, Maddboly M. Outcome of late preterm newborns. Fayoum University Medical Journal. ISSN: 2536-9474 (Print) Original article. 2019;2(1):1-8.
20. Grove S, Cipher D. Statistics of Nursing Research: A Workbook for Evidence- based Practice. (2nd ed). Elsevier, London, 2019, 95-101.
21. Wang G, Johnson S, Gong Y, Polk S, Divall S, Radovick S *et al*. Weight gain in infancy and overweight or obesity in childhood across the gestational spectrum: a Prospective Birth Cohort Study. Sci. Rep. 2019;6:29867.
22. Condon J, Corkindale C. The assessment of parent-to-infant attachment: Development of a self-report questionnaire instrument. Journal of Reproductive and Infant Psychology. 1998;16(1):57-76.
23. National Center for Chronic Disease Prevention and Health Promotion. Standardize Weight Growth Chart, 2000. Available at: http://www.cdc.gov/growthcharts.
24. Wittkowski A, Vatter S, Muhinyi A, Garrett Cand, Henderson M. Measuring bonding or attachment in the parent-infant-relationship: A systematic review of parent-report assessment measures, their psychometric properties and clinical utility. Clinical Psychology Review. 2022;82:101906. https://doi.org /10.1016/j.cpr.2020.101906
25. Yorkin M, Spaccarotella K, Biggers J, Virginia Quick. Accuracy and consistency of weights provided by home bathroom scales3. Journals BMC Public Health, 2018, 13(1).

26. Jefferies A, Canadian L. Facilitating discharge of the preterm infant. Paediatric Society, Fetus and Newborn Committee. Pediatric Child Health, 2018 Jan, 19(1). Available at: https://www.ncbi.nlm.nih.gov/pmc/

27. Taleghani N, Fallahi M, Soltanttooyeh Z, Shamshiri A, Radfa M. Post-Discharge Follow-Up of Preterm Infants at High-Risk Neonatal Follow-Up Clinic of a Maternity Hospital. Journal of Comprehensive Pediatrics. 2019;11(1):e93379. DOI:10.5812/compreped.93379

28. Paudela L, Balkrishna D, Kalakhetib D, Sharma CK. Prevalence and outcome of preterm neonates admitted to neonatal unit of a tertiary care center in Western Nepal. Article in Journal of Lumbini Medical College, 2020. DOI: 10.22502/jlmc.v6i2.218

29. Palomares M, Rejano M, Garrido-Ardila E, Fernández J, Ruiz P, Rodríguez J. The impact of a preterm baby arrival in a family: a descriptive cross-sectional. J. Clin. Med. 2021;10:4494.
https://doi.org/10.3390/jcm10194494

30. Stanford Children's Health. Prematurity, 2019. Available at: https://www.Stanfordchildrens.org/

31. Aldirawi A, El-Khateeb A, Mustafa A, Abuzerr S. Mothers' knowledge of health caring for premature infants after discharge from neonatal intensive care units in the Gaza Strip, Palestine, 2019, 9(3). Available at: https://www.scirp.org/journal/

32. Taha E, Hassan A, Wikkeling-Scott L, Papandreou D. Factors associated with preterm birth and low birth weight in Abu Dhabi, the United Arab. Int. J. Environ. Res. Public Health. 2020;17:1382.

33. Mohammad F, Mosayebi Z, Peyrovi H, Chehrzad M, Mehran A. The effect of mothers' empowerment program on premature infants' weight gain and duration of hospitalization, 2018. IP: 90.79.99.103. available at: http://www.ijnmrjournal.net

34. Abdel Razeq N, Khader Y, Batieha A. The incidence, risk factors, and mortality of preterm neonates: A prospective study from Jordan (2012-2013). Turk J Obstet Gynecol. 2019;14:28-36. Available at: DOI: 10.4274/tjod.62582

35. Mangili G, Garzoli E. Feeding of preterm infants and fortification of breast milk. La Pediatria Medica e Chirurgica. Medical and Surgical Pediatrics. 2019;39:158.

36. AL-Mukhtar S, Abdulghani M. Knowledge of mothers regarding premature baby care in Mosul city. Mosul Journal of Nursing. 2019;8(2):108-118.

37. Amolo L, Irimu G, Njai D. Knowledge of postnatal mothers on essential newborn care practices at the Kenyatta National Hospital: A Cross Sectional Study. The Pan African Medical Journal. 2018;28:97. Available at:
https://doi.org/10.11604/pamj.2017.28.97.13785

38. Yang Y, Brandon D, Lu H, Cong X. Breastfeeding experiences and perspectives on support among Chinese mothers separated from their hospitalized preterm infants: a qualitative study. International Breastfeeding Journal. 2019;14:45. Available at: https://doi.org/10.1186/s13006-019-0242-9

39. Wong D. Essentials of Pediatric Nursing. 9th edition. London: Elsevier Mosby Company, 2019, 595-612.

40. National Institutes of Health (NIH). Promoting maternal interaction improves growth, weight gain in preemies, 2019. Available at: www.nih.gov.

41. Leahy-Warren P, Coleman C, Bradley R, Mulcahy H. The experiences of mothers with preterm infants within the first-year post discharge from NICU: social support, attachment and level of depressive symptoms. BMC Pregnancy and Childbirth Leahy-Warren *et al*. BMC Pregnancy and Childbirth 2020;20:260. https://doi.org/10.1186/s12884-020-02956

42. Heo Y, Oh W. The effectiveness of a parent participation improvement program for parents on partnership, attachment infant growth in a neonatal intensive care unit: A randomized controlled trial. Int. J Nurs. 2019;95:19-27.

43. Twohig A, Murphy J, McCarthy A, Segurado R. The preterm infant–parent programme for attachment - PIPPA Study: A randomized controlled trial. Pediatr. Res. 2021;90:617-624.

44. Yeon K, Kim R. Attachment- and Relationship-Based Interventions during NICU Hospitalization for Families with Preterm/Low-Birth Weight Infants: A Systematic Review of RCT Data. Int. J Environ. Res. Public Health. 2022;19:1126.
https://doi.org/10.3390/ijerph19031126