



## THE EFFECT OF KANGAROO CARE EDUCATIONAL PROGRAM FOR MOTHER ON WEIGHT GAIN OF PREMATURE INFANTS IN NEONATAL INTENSIVE CARE UNITS

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### Cite this article:

Fatma E.R., Safaa S.I., Hyam R.T. (2022), The Effect of Kangaroo Care Educational Program for Mother on Weight Gain of Premature Infants in Neonatal Intensive Care Units. African Journal of Health, Nursing and Midwifery 5(3), 126-145. DOI: 10.52589/AJHNM-TVWEFW8U.

### Manuscript History

Received: 22 April 2022

Accepted: 7 May 2022

Published: 16 June 2022

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**ABSTRACT:** *Background:* Kangaroo care is one of the nursing practices with medical provision that can meet the important physical and emotional needs of the preterm such as warmth, stimulation, parental attachment, breast-feeding and safety. *Research design:* A quasi-experimental design was utilized in the current study. *Setting:* This study was conducted at neonatal intensive care unit in Beni Suef University Hospital. *Subjects:* A purposive sample of 50 mothers accompanying their premature infants. *Tools of data collection:* Three tools were used: tool (1) interviewing questionnaire: (pre, post and follow-up), tool (2) checklist of reported practices: (pre, post and follow-up), tool (3) knowledge of the mother about kangaroo care technique: (pre, post and follow-up). *Results:* 88% of the studied mothers had unsatisfactory level of knowledge in the pre educational program implementation. While, 96% of them had satisfactory level of knowledge in the post educational program implementation. 64% of the studied mothers had incompetent practices in the pre educational program implementation, while 58% of the studied mother had competent practices in the post educational program implementation. *Conclusion:* The educational program had a significant positive effect on improving mothers' knowledge, practices regarding kangaroo care. *Recommendation:* Continuous educational programs to increase awareness of the mothers about Kangaroo Mother Care to ensure enough knowledge and practice about KMC.

**KEYWORDS:** Educational program, Mothers knowledge, Practices, kangaroo mother care.



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## INTRODUCTION

Kangaroo mother care (KMC) is skin-to-skin contact between the mother and the baby. It is a safe and inexpensive procedure that has proven benefits for mothers and children as compared to an incubator caring method. It plays a significant role on infant survival, neurodevelopment, and the quality of mother-infant bonding. KMC complements good quality care and allows providers to ration use of expensive resources such as warmers and incubators (*Jagdale, 2017*).

Preterm birth is considered to be the largest direct cause of neonatal mortality, accounting for an estimated 27% of the 4-million neonatal deaths every year. According to the World Health Organization (WHO), of all early neonatal deaths occurring within the first 7 days of life, 28% are due to preterm birth (*Tully, 2016*).

Kangaroo mother care is defined as early, prolonged, skin-to-skin contact between a mother and her low birth-weight (LBW) newborn. It can take place both in hospital and at home, and is usually continued until the baby reaches at least 2,500 grams in weight or 40 weeks age. Continuous KMC is practiced 24 hours every day and requires support from family members, including the husband or partner. Family members can assist the mother with continuous KMC by keeping the new born infants skin-to-skin when the mother has to bath or attend to personal need (*Ehalik, 2016*).

The kangaroo position provides ready access to nourishment. The WHO adjusted the kangaroo care's instructions and encouraged its application in developing countries.; the incubators are often insufficient to meet the requirements of premature infants weight gain or not clean enough; the purchase of equipment and spare parts, maintenance and repair are difficult and expensive (*Bigelow, 2017*).

Kangaroo care is a technique practiced on newborn, usually preterm, infants wherein the infant is held, skin-to-skin, with an adult. Kangaroo care for pre-term infants may be restricted to a few hours per day, but if they are medically stable that time may be extended. Some parents may keep their infants in-arms for many hours per day (*Higgins, 2016*).

Nurses are the main contributors in kangaroo care of premature infants and their mothers. Nurses must be thoroughly aware with the several recent advances in kangaroo care technique and educate mothers about it to improve weight gain of the premature infants (*Kely& Carman, 2017*).

Kangaroo care is one of the nursing practices with medical provision that can meet the important physical and emotional needs of the preterm such as warmth, stimulation, parental attachment, breast-feeding and safety. Previous research confirmed the KMC effectiveness for promoting the preterm and term infant's health, well-being and encourages the parents' participation in the infant's care (*Raman, 2017*).

Therefore, the neonatal nurse should provide the appropriate care, and encourage bonding which is considered as one of the utmost benefits with parents especially during the first two weeks of life when the neonate and family are most vulnerable (*Chowdhury, 2017*).



In many countries, KMC was practiced in Neonatal Intensive Care Units (NICUs) for premature and low-birth weight infants and their families, allowing them to play a significant role in the care and survival of their neonate within the NICU setting. KMC provides a physical environment as safe as the incubator. Previous research has proven that KMC has been proved to be effective for maintaining body temperature, breastfeeding, stimulation and bonding irrespective of setting, weight, gestational age, and clinical conditions (*Salunkhee, 2017*).

## **SUBJECTS AND METHODS**

### **Significance of the study:**

Premature infants in the Neonatal Intensive Care Unit is a critical care area, many newborn infants enter the area with multi needs and complications and become separated from their mothers which lead to many harmful results and negative attitudes to the infant, so an accurate management of premature infants will improve their outcome by having effect on electrophysiological measures as well as increase in weight. Close contact occurring when practicing kangaroo care allows mother to easily breastfeed premature infants whenever needed (*Ahn, 2018*).

In Beni-Suef University Hospital, no study has been conducted to evaluate the effect of kangaroo care educational program for mother on weight gain of premature neonates in the neonatal intensive care units. Therefore, from the researcher experience, it is important to conduct this study to evaluate the effect of kangaroo care educational program for mother on weight gain of premature neonates in neonatal intensive care units.

### **Aim of the study:**

This study aims to:

1. Assess the mothers' knowledge about kangaroo care.
2. Design and implement an educational program for mothers about kangaroo care technique.
3. Evaluate the effect of educational program for mother on weight gain of premature neonates in Neonatal Intensive Care Units.

### **Research hypothesis**

Kangaroo Care educational program for mother will affect positively in premature infant weight gain.



## **Subjects and Methods**

### **Research Design:**

A quasi-experimental design was utilized to conduct this study

### **Research Setting:**

This study was conducted at Neonatal Intensive Care Unit (NICU) in Beni Suif University Hospitals. The neonatal intensive care unit in Beni Suif University Hospitals located in the sixth floor, consists of three rooms, the first room contains 8 incubators, the second room contains 8 incubators and the third room contains 4 incubators.

### **Subjects:**

A purposive sample of 50 mothers' accompanying their premature after fulfilling the following criteria:

### **Sampling technique:**

A purposive sample of all premature infants will be included in the study under the following:

### ***Inclusion criteria***

1. Weight from 1000gm to 2500gm.
2. Gestational age less than 37 weeks.
3. Mothers willing to participate in the study.

### ***Exclusion criteria***

1. Premature infants on mechanical ventilation or CPAP.
2. Premature infants with congenital anomaly include heart disease, surgical problem and hypoxia.

### **Tools for data collection:**

Data will be collected through the use of the following tools:

#### **1<sup>st</sup> tool: Interviewing questionnaire: (pre, post and follow up)**

It will be designed by the researcher after reviewing the current literature and translated to simple Arabic language. It will consist of the following parts:



**Part I:** Characteristic of the studied mother such as (age, occupation, qualification and past and present history of pregnancy ... etc).

**Part II:** Characteristic of the premature infants including gender, gestational age, postnatal age, physiological assessment, physical assessment .. etc.

**2<sup>nd</sup> tool: Checklist of reported practices: (pre, post and follow up)**

It will be adopted from *Ward, (2016)* to assess the reported practices of the mother about KC technique, hand washing technique and umbilical care technique.

**3<sup>rd</sup> tool: Knowledge of the mother about kangaroo care technique: (pre, post and follow up)**

Knowledge of Mothers' about Kangaroo Care (technique, definition, importance .....

The above tools will be assessed twice pre/ post program intervention.

**4<sup>th</sup> tool: Educational program:**

The researcher will plan and implement educational program based on actual needs assessment of the studied mothers. Each mother will be assessed twice pre/post implementation of educational program using the previously mentioned tools.

**Validity:**

Revision of the tools will be done by a panel of expertise to measure the content validity of the tools and the necessary modification will be done accordingly.

**Reliability:**

Test- retest reliability will be applied by the researcher for testing the internal consistency of the tool. It refers to administration of the same tool to the same subjects under similar condition on two or more occasions. Score from repeated testing will be compared.

**Pilot study:**

Will be carried out on 10% of study to test the applicability, clarity and the efficiency of the tools, then the tool will be modified according to the result of pilot study.

**Field Work**

The following phases were adopted to achieve the aim of the current study; assessment, planning, implementation and evaluation phases. These phases were conveyed from the earliest starting point of July 2020 to March 2021 covering 9 months.

**Assessment Phase**

Assessment phase involved interviews with mothers' and premature infants to collect baseline data. Data was collected in three days/ week by rotation from 10:00 AM and extended to 2:00 PM, number of mothers taken every day was ranged from 4-5 mothers daily. At the beginning of interview; the researcher welcomed mothers, explained the purpose, duration, activity of the study and take their oral approval to participate in the study prior to



data collection. The data of the mothers was collected and it took 15 minutes for each mother. Then the researcher gave the studied mothers questionnaire (Tool I & Tool II) for filling it to assess their knowledge and their reported practices, it took nearly 30- 45 minutes. This period of pretest took 4 weeks (from the beginning of July 2020 to the beginning of August 2020).

### **Planning phase**

Based on baseline data obtained from assessment phase and relevant review of literature, the educational program was designed by the researcher for mothers and their premature infants according to their needs. It was constructed, revised and modified from the related literature to improve the mothers' knowledge, reported practices.

**Program construction:** It took one month from the beginning of August 2019 to the beginning of September 2019.

### **Statement of objectives**

#### ***General objective of the program***

At the end of the educational program each mother should be able to acquire Kangaroo Practice Application (KPA) regarding KC.

#### ***Specific objectives:***

At the end of the program the mothers will be able to:

- Identify the concept of premature infant.
- Identify the premature infant categories.
- Predisposing factors and characteristics of premature.
- List the short-term and long-term complication of premature.
- Identify the importance of KMC technique.
- Learn what is KMC technique.
- Apply the daily routine care (umbilical cord care).
- Apply KMC steps.

### ***Implementation phase***

This phase took six months from the beginning of April 2021 to the end of September 2021.

The implementation phase was achieved through sessions, each session started by a summary of the previous session and objective of the new one. Taking into consideration the use of Arabic language that suits the mothers' educational level. Motivation and reinforcement during sessions were used to enhance motivation for the sharing in the study. The studied mothers were divided into 10 groups in one hospital; each group consisted of 5 mothers. The total number of sessions was 10 sessions, 6 sessions for theoretical part and 4 sessions for



practical part. The program has taken 14 hours for each group. The theoretical sessions started at 10:00 AM to 12:00 PM, practical sessions started at 10:00AM to 2:00PM .These sessions were repeated to each group.

Theoretical part as the following; the first session of the program included 1- Introduction to the premature infant and KMC, 2- The categories of premature infants and 3- Reasons of premature delivery. The second session included 1- The risk factors, 2- Symptoms, 3- Short-term and long-term health problems and 4- The prevention. The third session included 1- The definition of KMC, 2- Types of KMC and 3- Intermittent KMC. The fourth session included 1- KMC duration, 2- KMC qualification criteria, 3- Infants undergoing phototherapy and 4- Infants in need for tubal feed. The practical part as the following: The fifth session included steps to train mother's about hand washing technique. The sixth session included 1- Steps to train the mothers on KMC (position and recommendations).

### ***Program evaluation***

This phase took one month from the beginning of March 2020 to the end of March 2020.

After the implementation of the program contents, the post test was carried out to assess mothers knowledge, reported practices by using the same formats of pretest.

### **Ethical Considerations**

The researcher clarified the aim of the study to the studied mothers' and verbal approval was prerequisite to participate in the study. Mothers' were assured that all gathered data were used in research purpose only and the study was harmless. Additionally, mothers were allowed to withdraw from the study at any time without giving the reason. Confidentiality of the gathered data and results were secured.

### **Statistical Design:**

The collected data organized, tabulated and statistically analyzed using Statistical Package for Social Science (SPSS) version 21 for windows, running on ACER compatible computer. Descriptive statistics were applied (e.g. frequency, percentages, mean and standard deviation). Test of significance, Chi-square test ( $\chi^2$ ) this test used to measure significant of qualitative variables and correlation coefficient (r) used for quantitative variables that were normally distributed or when one of the variables is qualitative, these tests were applied to test the study hypothesis. Comparison of means using paired T test and independent T test for parametric data. Analysis of variance (ANOVA test) used for comparison of means more than two categories. A significant level value was considered when  $p < 0.05$  and a highly significant level value was considered when  $p < 0.001$ . No statistical significance difference was considered when  $p > 0.5$ .

### **Significance of the study:**

Premature infants in the NICU is a critical care area, many newborn infants enter the area with multi needs and complications and become separated from mothers which lead to many harmful results and negative attitudes to the infant, so an accurate management of premature infants will improve their outcome by having effect on electrophysiological measures as well as increase in weight. The closet contact occurs when mothers are giving K.C. because



mothers hold their diapered infants underneath clothing and allow self-regulatory breastfeeding, while infant in the kangaroo position is able to breastfeed whenever wants.

In Beni-suef university hospital, no study has been conducted to evaluate the effect of kangaroo care educational program for mother on weight gain of premature neonates in neonatal intensive care units. Therefore, from the researcher's point of view, it is important to conduct this study to evaluate the effect of kangaroo care educational program for mother on weight gain of premature neonates in neonatal intensive care units.

## RESULTS

- The current study finding showed that 64% of the studied mothers were in the age group 20 > 30 years old with mean age  $26.20 \pm 5.4$ ; concerning educational level 72% of the studied mother read and write; in addition, it was found that 68% are working.
- The present study revealed that 42% of the studied premature infants were aged 32 > 33 weeks and 84% of them were female.
- The current study showed that 88% of the studied mothers had unsatisfactory level of knowledge in pre-program implementation, while 96% of the studied mothers had satisfactory level of knowledge in post-program implementation.
- The current study indicated that 64% of the studied mothers had incomplete level of reported practice in pre-program implementation, while 58% of the studied mothers had complete level of reported practice in post-program implementation.
- The present study revealed that there was highly statistically significant relation between total knowledge and reported practices.
- The present study illustrated that there was highly statistical significant  $\leq 0.05$  positive correlation between mother's total knowledge and total reported practices on pre/ post educational program implementation with P value  $\leq 0.05$ .

**Table (1): Demographic Characteristics of the Studied Mothers. (n=50)**

	No.	Percentage
<b>Age</b>		
< 20	6	12.0
20 < 30	32	64.0
$\geq 30$	12	24.0
<b>Mean <math>\pm</math> SD</b>	<b>26.20 <math>\pm</math> 5.94</b>	
<b>Education</b>		
Illiterate	14	28.0
Read and Write	36	72.0
<b>Employment</b>		
Working	34	68.0
Not working	16	32.0
<b>History of parity</b>		

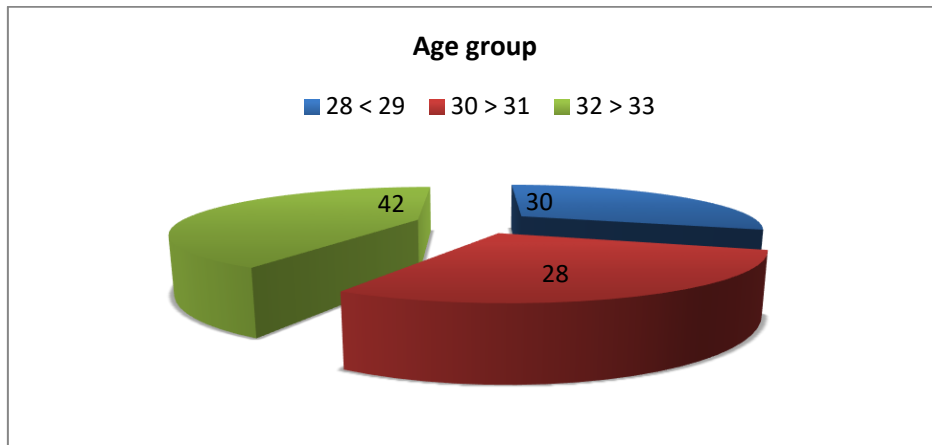




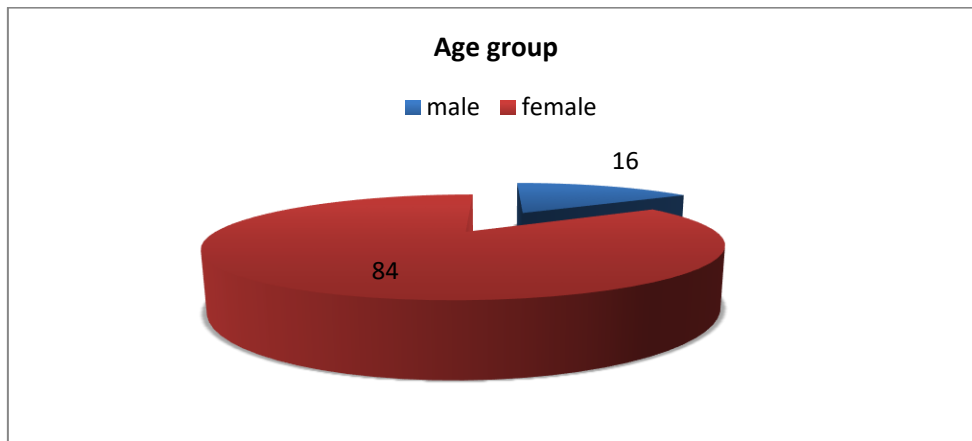
< 3	17	34.0
$3 \leq 4$	33	66.0
<b>Mean <math>\pm</math> SD</b>	<b><math>2.82 \pm 0.96</math></b>	
<b>Type of delivery</b>		
Normal vaginal delivery	17	34.0
Cesarean section	33	66.0

**Table (2): Demographic Characteristics the Studied Premature Neonates. (n=50)**

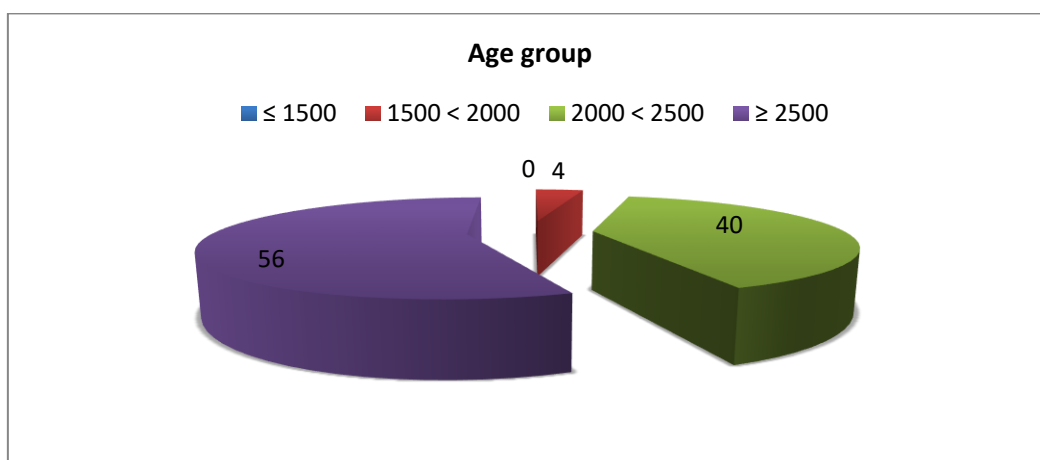
	No.	Percentage
<b>Age</b>		
28 < 29	15	30.0
30 > 31	14	28.0
32 > 33	21	42.0
<b>Mean <math>\pm</math> SD</b>	<b><math>28.85 \pm 1.06</math></b>	
<b>Sex</b>		
Male	8	16.0
Female	42	84.0
<b>Birth weight</b>		
$\leq 1500$	0	0.0
$1500 < 2000$	2	4.0
$2000 < 2500$	20	40.0
$\geq 2500$	28	56.0
<b>Mean <math>\pm</math> SD</b>	<b><math>1170.00 \pm 1347.18</math></b>	
<b>Prematurity causes</b>		
PROM	17	34.0
PET/Eclampsia	19	38.0
GDM	7	14.0
Hypothyroidism	7	14.0
<b>Length of Hospital Stay</b>		
< 3	6	12.0
$3 \leq 6$	44	88.0
<b>Mean <math>\pm</math> SD</b>	<b><math>4.14 \pm 0.98</math></b>	
<b>Weight gain (gram)</b>		
< 50	2	4.0
$50 \leq 100$	48	96.0
<b>Mean <math>\pm</math> SD</b>	<b><math>73.00 \pm 9.90</math></b>	



**Figure (1) Distribution of the premature infants according to their age**



**Figure (2) Distribution of the premature infants according to their sex**



**Figure (3) Distribution of the premature infants according to their birth weight**

**Table (3): Knowledge of the studied mothers about prematurity (pre & post) (n=50)**

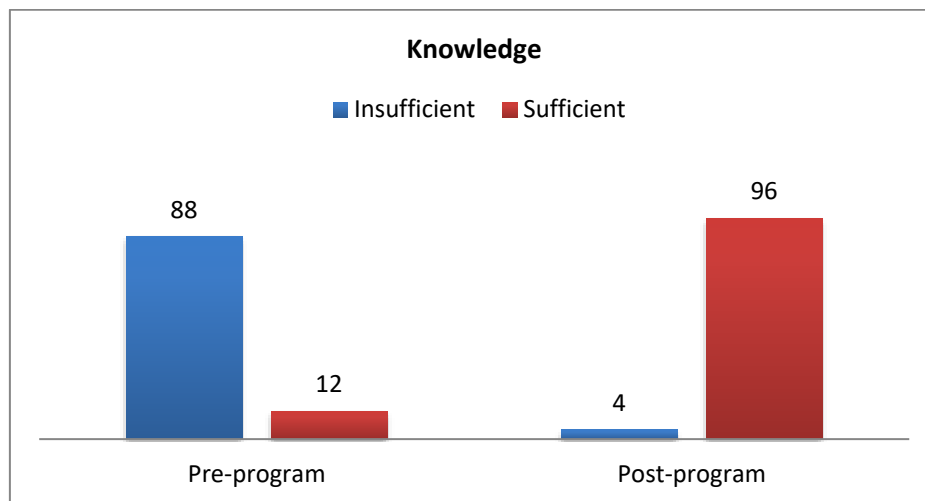
	Pre						Post						X <sup>2</sup>	P value
	0		1		2		0		1		2			
	N	%	N	%	N	%	N	%	N	%	N	%		
Premature definition	15	30.0	27	54.0	8	16.0	0	0.0	8	16.0	42	84.0	48.434	0.000**
Premature problem	27	54.0	23	46.0	0	0.0	0	0.0	20	40.0	30	60.0	57.209	0.000**
Premature causes	28	56.0	22	44.0	0	0.0	3	6.0	18	36.0	29	58.0	49.561	0.000**
Premature physical features	18	36.0	12	24.0	20	40.0	0	0.0	13	26.0	37	74.0	23.110	0.000**
Premature needs	36	72.0	14	28.0	0	0.0	2	4.0	14	28.0	34	68.0	64.421	0.000**
Prevention of premature	11	22.0	33	66.0	6	12.0	0	0.0	25	50.0	25	50.0	23.749	0.000**
Care of premature	24	48.0	26	52.0	0	0.0	0	0.0	19	38.0	31	62.0	56.089	0.000**

X<sup>2</sup> Chi Square test<sup>FE</sup> Expected cell count less than 5, Fisher's exact test was used**Table (4): Knowledge of the Studied Mothers about KMC (pre & post) (n=50)**

	Pre						Post						X <sup>2</sup>	P value
	0		1		2		0		1		2			
	N	%	N	%	N	%	N	%	N	%	N	%		
Definition	8	16.0	33	66.0	9	18.0	0	0.0	26	52.0	24	48.0	16.245 <sup>FE</sup>	0.000**
Place of occurrence	35	70.0	10	20.0	5	10.0	0	0.0	8	16.0	42	84.0	64.350	0.000**
KMC advantages	18	36.0	30	60.0	2	4.0	0	0.0	25	50.0	25	50.0	38.047	0.000**
KMC duration	14	28.0	31	62.0	5	10.0	0	0.0	19	38.0	31	62.0	35.658	0.000**
Newborn care	33	66.0	16	32.0	1	2.0	1	2.0	20	40.0	29	58.0	56.695	0.000**
Weight 2500gm	5	10.0	36	72.0	9	18.0	1	2.0	21	42.0	28	56.0	16.370 <sup>FE</sup>	0.000**
KMC importance for mother	21	42.0	25	50.0	4	8.0	2	4.0	5	10.0	43	86.0	61.391	0.000**
KMC importance for baby	6	12.0	36	72.0	8	16.0	1	2.0	28	56.0	21	42.0	10.244 <sup>FE</sup>	0.005**

X<sup>2</sup> Chi Square test<sup>FE</sup> Expected cell count less than 5, Fisher's exact test was used.

\*\* Highly statistical significant at p≤0.01.



**Figure (4) Total Score of Knowledge Pre and Post Program among Studied Mothers.**

**Table (5): Mother's practice regarding KMC. (n=50)**

Technique of KMC	Pre				Post				X <sup>2</sup>	P value
	Not done		Done		Not done		Done			
	N	%	N	%	N	%	N	%		
Baby dressing	16	32.0	34	68.0	3	6.0	47	94.0	10.981	0.001**
Mother position	28	56.0	22	44.0	4	8.0	46	92.0	26.471	0.000**
Baby position	30	60.0	20	40.0	10	20.0	40	80.0	16.667	0.000**
Secure the baby to the mother's chest	16	32.0	34	68.0	8	16.0	42	84.0	3.509	0.061
Cover the baby	29	58.0	21	42.0	10	20.0	40	80.0	15.174	0.000**
Mother's ability to repeat	16	32.0	34	68.0	6	12.0	44	88.0	5.828	0.016*

X<sup>2</sup> Chi Square test

\* Statistically significant at  $p \leq 0.05$

\*\* Highly statistical significant at  $p \leq 0.01$

**Table (6): Mothers reported practice about Hand Washing Technique. (n=50)**

Hand washing technique	Pre				Post				X <sup>2</sup>	P value
	Not done		Done		Not done		Done			
	N	%	N	%	N	%	N	%		
Remove jewelry	16	32.0	34	68.0	19	38.0	31	62.0	0.396	0.529
Wet hands	29	58.0	21	42.0	5	10.0	45	90.0	25.668	0.000**
Antiseptic soap application	16	32.0	34	68.0	5	10.0	45	90.0	7.294	0.007**
Rub palms	16	32.0	34	68.0	15	30.0	35	70.0	0.047	0.829
Use one hand to rub the other's back	29	58.0	21	42.0	9	18.0	41	82.0	16.978	0.000**
Rub fingers	16	32.0	34	68.0	17	34.0	33	66.0	0.045	0.832
Rub palms with fingers	25	50.0	25	50.0	5	10.0	45	90.0	19.048	0.000**
Thumb washing	10	20.0	40	80.0	5	10.0	45	90.0	1.961	0.161
Rub fingers tips against opposite palm	16	32.0	33	66.0	8	16.0	42	84.0	3.737	0.053
Rinse hands	28	56.0	21	42.0	6	12.0	44	88.0	22.366	0.000**
Taps off with elbows	15	30.0	34	68.0	5	10.0	45	90.0	6.522	0.011*
Dry hands using paper towel	23	46.0	26	52.0	7	14.0	43	86.0	12.713	0.000**

X<sup>2</sup> Chi Square test

\* Statistically significant at p≤0.05

\*\* Highly statistical significant at p≤0.01

**Table (7): Mother's reported practice about infant weight. (n=50)**

Infant weight	Pre				Post				X <sup>2</sup>	P value
	Not done		Done		Not done		Done			
	N	%	N	%	N	%	N	%		
Place scale horizontally	27	54.0	23	46.0	6	12.0	44	88.0	19.946	0.000**
Scale = 0 point	19	38.0	31	62.0	8	16.0	42	84.0	6.139	0.013*
Wipe scale using cotton & alcohol	25	50.0	25	50.0	7	14.0	43	86.0	14.890	0.000**
Infant undressing	35	70.0	15	30.0	12	24.0	38	76.0	21.236	0.000**
Scale paper placement	27	54.0	23	46.0	9	18.0	41	82.0	14.063	0.000**
Placing the infant in the scale basket	32	64.0	18	36.0	5	10.0	45	90.0	31.274	0.000**
Secure the infant on scale	23	46.0	27	54.0	7	14.0	43	86.0	12.190	0.000**
Refer physician	19	38.0	31	62.0	5	10.0	45	90.0	10.736	0.001**
Balance the scale	0	0.0	0	0.0	7	14.0	43	86.0	-	-
Scale reading	0	0.0	0	0.0	16	32.0	34	68.0	-	-

X<sup>2</sup> Chi Square test

- Missing data

\* Statistically significant at p≤0.05

\*\* Highly statistical significant at p≤0.01



**Table (8): Frequencies for Checklist of Umbilical Cord Care among Studied Mothers. (n=50)**

Umbilical cord care	Pre				Post				X <sup>2</sup>	P value
	Not done		Done		Not done		Done			
	N	%	N	%	N	%	N	%		
Place infant in supine position	13	26.0	37	74.0	7	14.0	43	86.0	2.250	0.134
Put on gloves	31	62.0	19	38.0	7	14.0	43	86.0	24.448	0.000**
Sterilizing the gauzes	37	74.0	13	26.0	8	16.0	42	84.0	33.980	0.000**
Cord inspection	23	46.0	27	54.0	8	16.0	42	84.0	10.519	0.001**
Cord body cleaning	17	34.0	33	66.0	13	26.0	37	74.0	0.762	0.383
Stump base cleaning	10	20.0	40	80.0	6	12.0	44	88.0	1.190	0.275
Clamp cleaning	0	0.0	0	0.0	3	6.0	47	94.0	-	-
Hand wash	0	0.0	0	0.0	9	18.0	41	82.0	-	-

X<sup>2</sup> Chi Square test

- Missing data

\* Statistically significant at  $p \leq 0.05$

\*\* Highly statistical significant at  $p \leq 0.01$

**Table (9): Frequencies for Checklist of Physiological Change Assessment among Premature Infants. (n=50)**

	1 <sup>st</sup> attempt		2 <sup>nd</sup> attempt		3 <sup>rd</sup> attempt		4 <sup>th</sup> attempt		5 <sup>th</sup> attempt	
	Pre	Post	Pre	Post	Pre	Post	Pre	Post	Pre	Post
Heart rate	151	151	160	148	151	151	150	147	149	150
Respiratory rate	55	54	54	54	54	53	52	53	52	50
Oxygen Saturation	97	98	98	99	99	99	99	99	98	98
Temperature	36.9	36.8	36.9	36.8	36.8	36.7	36.9	36.1	36.8	36.6
Blood pressure	67/41	67/42	62/42	64/38	66/40	65/40	64/39	63/42	66/41	65/39

**Table (10): Distribution of the premature infants according to the daily weight gain mean**

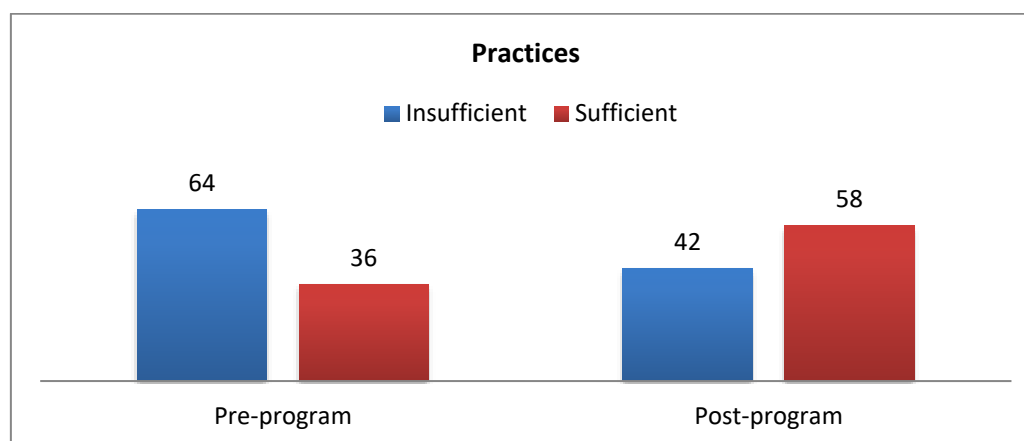
	1 <sup>st</sup> attempt	2 <sup>nd</sup> attempt	3 <sup>rd</sup> attempt	4 <sup>th</sup> attempt	5 <sup>th</sup> attempt	6 <sup>th</sup> attempt	7 <sup>th</sup> attempt
Daily weight gain	1.36	1.37	1.43	1.47	1.48	1.51	1.53

**Table (11): Following-up wt of the premature infants**

Mean	Median	Mode	Minimum	Maximum	Std. Deviation
48	47.00	45(a)	16	104	19.870

**Table (12): Total score of Practice about premature care( Pre and Post). (n=50)**

	Pre				Post				X <sup>2</sup>	P value
	Insufficient		Sufficient		Insufficient		Sufficient			
	N	%	N	%	N	%	N	%		
Knowledge	44	88.0	6	12.0	2	4.0	48	96.0	71.014	0.000**
KMC practice	27	54.0	23	46.0	2	4.0	48	96.0	30.355	0.000**
Hand washing technique	30	60.0	20	40.0	7	14.0	43	86.0	22.694	0.000**
Infant's weight	36	72.0	14	28.0	4	8.0	46	92.0	42.667	0.000**
Umbilical cord care	40	80.0	10	20.0	3	6.0	47	94.0	55.855	0.000**
Physiological changes	19	38.0	31	62.0	4	8.0	46	92.0	12.705	0.000**
Total Practice	32	64.0	18	36.0	21	42.0	29	58.0	4.857	0.0275*

X<sup>2</sup> Chi Square test\* Statistically significant at  $p \leq 0.05$ \*\* Highly statistical significant at  $p \leq 0.01$ **Figure (5) Total score of Practice Pre and Post Program among Studied Mothers.**

**Table (13/1): Relation between demographic Characteristics and Knowledge among Studied Mothers. (n=100)**

	Knowledge				X <sup>2</sup>	P value
	Unsatisfactory		Satisfactory			
	N	%	N	%		
<b>Age</b>						
< 20	4	8.7	8	14.8	1.432	0.488
20 < 30	29	63.0	35	64.8		
≥ 30	13	28.3	11	20.4		
<b>Education</b>						
Illiterate	9	19.6	19	35.2	3.006	0.083
Read and Write	37	80.4	35	64.8		
<b>Employment</b>						
Working	35	76.1	33	61.1	2.560	0.110
Not working	11	23.9	21	38.9		
<b>Parity</b>						
< 3	16	34.8	18	33.3	0.023	0.879
3 ≤ 4	30	65.2	36	66.7		
<b>Type of delivery</b>						
Normal vaginal delivery	16	34.8	18	33.3	0.023	0.879
Cesarean section	30	65.2	36	66.7		

X<sup>2</sup> Chi Square test**Table (13/2): Relation between demographic Characteristics and Knowledge among Studied Mothers. (n=50)**

	Knowledge – Pre Program				X <sup>2</sup>	P value
	Unsatisfactory		Satisfactory			
	N	%	N	%		
<b>Age</b>						
< 20	3	6.8	3	50.0	7.143 <sup>FE</sup>	0.019*
20 < 30	29	65.9	3	50.0		
≥ 30	12	27.3	0	0.0		
<b>Education</b>						
Illiterate	8	18.2	6	100.0	17.571 <sup>FE</sup>	0.000**
Read and Write	36	81.8	0	0.0		
<b>Employment</b>						
Working	34	77.3	0	0.0	15.522 <sup>FE</sup>	0.000**
Not working	10	22.7	6	100.0		
<b>Parity</b>						
< 3	15	34.1	2	33.3	0.001 <sup>FE</sup>	0.971
3 ≤ 4	29	65.9	4	66.7		
<b>Type of delivery</b>						
Normal vaginal delivery	15	34.1	2	33.3	0.001 <sup>FE</sup>	0.971
Cesarean section	29	65.9	4	66.7		

X<sup>2</sup> Chi Square test<sup>FE</sup> Expected cell count less than 5, Fisher's exact test was used.

\* Statistically significant at p≤0.05

\*\* Highly statistical significant at p≤0.01





**Table (14/1): Relation between demographic Characteristics and Practice among Studied Mothers. (n=100)**

	Practice				X <sup>2</sup>	P value
	Unsatisfactory		Satisfactory			
	N	%	N	%		
<b>Age</b>						
< 20	5	9.4	7	14.9	0.893	0.640
20 < 30	34	64.2	30	63.8		
≥ 30	14	26.4	10	21.3		
<b>Education</b>						
Illiterate	11	20.8	17	36.2	2.936	0.087
Read and Write	42	79.2	30	63.8		
<b>Employment</b>						
Working	40	75.5	28	59.6	2.893	0.089
Not working	13	24.5	19	40.4		
<b>Parity</b>						
< 3	20	37.7	14	29.8	0.701	0.402
3 ≤ 4	33	62.3	33	70.2		
<b>Type of delivery</b>						
Normal vaginal delivery	20	37.7	14	29.8	0.701	0.402
Cesarean section	33	62.3	33	70.2		

X<sup>2</sup> Chi Square test

**Table (14/2): Relation between demographic Characteristics and Practice among Studied Mothers. (n=50)**

	Practice – Pre Program				X <sup>2</sup>	P value
	Unsatisfactory		Satisfactory			
	N	%	N	%		
<b>Age</b>						
< 20	3	14.3	3	10.3	0.327 <sup>FE</sup>	0.920
20 < 30	13	61.9	19	65.5		
≥ 30	5	23.8	7	24.2		
<b>Education</b>						
Illiterate	9	42.9	5	17.2	3.964	0.046*
Read and Write	12	57.1	24	82.8		
<b>Employment</b>						
Working	14	66.7	20	69.0	0.030	0.863
Not working	7	33.3	9	31.0		
<b>Parity</b>						
< 3	7	33.3	10	34.5	0.007	0.933
3 ≤ 4	14	66.7	19	65.5		
<b>Type of delivery</b>						
Normal vaginal delivery	7	33.3	10	34.5	0.007	0.933
Cesarean section	14	66.7	19	65.5		

X<sup>2</sup> Chi Square test

<sup>FE</sup> Expected cell count less than 5, Fisher's exact test was used.

\* Statistically significant at p≤0.05



**Table (15): Relation and Correlation between Total score of Knowledge and Practice among Studied Mothers. (n=50)**

	Knowledge			
	Pre		Post	
	R	P	r	P
KMC practice	0.621	0.000**	0.393	0.005**
Hand washing technique	0.390	0.005**	0.610	0.000**
Infant's weight	0.556	0.000**	0.558	0.000**
Umbilical cord care	0.729	0.000**	0.513	0.000**
Physiological changes	0.732	0.000**	0.347	0.014*
Total Practice	0.936	0.000**	0.671	0.000**

r Pearson correlation test

\* Statistically significant at  $p \leq 0.05$

\*\* Highly statistical significant at  $p \leq 0.01$

## DISCUSSION

According to characteristics of studied mothers, the present study revealed that the mean age of studied mothers was 26.20+-5.94 years. This could be due to age of the mother was important in providing knowledge for care of the premature infants and understanding new experience with the care and technique. This result was supported by the study of Omar (2018), who found that two thirds of the studied mothers were ranging from 20 to 30 years with mean 25.9 years.

This study was in agreement with (Ibrahim et al., 2017) who found more than three fourths of mothers' age was 20<30 years stated that a longer proportion of premature births have been found among infants born to younger than to older mothers. They added that the lowest incidence of premature is in the age period 26-35 years. Premature and low birth weight cases were most frequent among young mothers who were under twenty. Also, if the mother is less than 18 years of age or over 35 there is a higher risk of delivering prematurely.

In addition, according to the level of education, the current work stated that more than two thirds of the studied mothers could read and write, and were working with nearly two thirds of them had  $3 \leq 4$  children with cesarean section. This finding was in accordance with Hussein (2016), who found that more than two thirds of the studied sample could read and write and more than half of them had  $3 \leq 4$  children with C.S. This result was in agreement with (Rahman, 2019), who found that the incidence of premature infants was less among highly educated mothers than mothers of no or low education. However, many studies revealed that decrease health awareness of the mother was one of the predisposing factors which lead to premature birth and that education and cultural level have an effect on infant's condition both before and after birth.

This result was not supported by (EL-Azim, 2018) who reported that prematurity was higher in infants delivered for women employed outside home, particularly when employment has been continued longer during their pregnancy. Also it was reported by that mothers working



for cash had a higher rate of premature birth than housewives. Maternal work, however, could have an effect on pregnancy independently of its nutritional effect. In particular physical exertion or upright posture might diminish uterine blood flow and thus hinder the supply of oxygen and nutrients to the fetus

Regarding characteristic of premature infants, the present study revealed that gestational age of more than two fifths of them were between 32/33 weeks with mean  $\pm$  SD 28.85.  $\pm$  1.06 the majority of them were female, weight of more than half of them was 1170.00  $\pm$  1347.18, and the majority of them stayed at hospital and had weight gain with 73.00  $\pm$  9.90.

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