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Effect of Educational Intervention on Preterm Infant's Mothers' Knowledge Regarding Their Caring Skills and Coping abilities

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Abstract:

Background: Preterm infants' caring is considered one of the most challenging and stressful events for mothers. **Aim:** To investigate the effect of educational intervention on preterm infant's mothers' knowledge regarding their caring skills and coping abilities. **Subjects and Methods:** A quasi-experimental (pre-post-test) research **design** was applied at the neonatal intensive care unit in Assiut University Children Hospital. **Three tools** were used: A structured interview questionnaire for the mothers, mothers' knowledge regarding their caring skills, and coping health inventory for parents scale. **Results:** The findings demonstrated that only 12 % of the studied mothers had good score of knowledge in pretest which increased significantly to 85% in posttest .Also, 61% of the mothers their coping abilities were adaptive in pretest increased significantly to 98% in posttest. Moreover, there was a statistically negative correlation between level of mothers' coping abilities and their total knowledge level regarding their caring skills in the pretest which was changed positively in posttest. **Conclusion:** The planned educational intervention would positively increase the mothers' knowledge about caring skills and would have adaptive coping abilities during the care of their preterm infants. **Recommendations:** Educational programs for mothers about caring for their preterm infants should be included in clinical routine care.

Keywords: Caring skills, coping abilities, Educational intervention, Mothers & Preterm infants.

Introduction

Preterm birth is defined as the birth before 37 weeks of gestation. It stills a major cause of mortality and morbidity worldwide among infants. Globally, about 15 million infants are born preterm annually **[World Health Organization, 2015].** In Egypt, about 123.13% of preterm infants were born at 32-37 weeks. This statistic may point to the higher rate of hospital admission in NICUs every year **[Cited by Hassan et al., 2020].**

Neonates who born preterm are at higher risk for serious health problems. Because they are born earlier than the expected date, will have less weight, their organs less developed, and more complications will face. Very preterm infants have more risk of death and getting disabilities. Preterm infants always look small and sick and look different from full-term neonates. So the preterm infants have special needs, which made their care different from that of full-term infants **(Shibi, 2014)**.

Preterm infants' caring is considered one of the most challenging and stressful events for mothers. The mothers of preterm infants need to have the preterm infant's caring skills to support the respiratory and cardiac system, prevent hypothermia, know feeding techniques of preterm, kangaroo care, and prevent infection **(Shibi, 2014)**. In studies **cited by Puthussery et al. (2018)** revealed that higher stress levels and caring difficulties were documented by preterm infants' mothers compared to those of full-term infants. The health and development of children are the prime responsibility of their mothers. Also, **The United Nations Office on Drugs and Crime (UNODC) (2017)** mentioned that there is an important need to support parents in the early years of their children's lives through developing and implementing educational programs. Moreover, **Landsem et al. (2015)** stated that there is good quality evidence showed that the successful effect of early interventions in promoting effective parenting and thus promoting children's health.

Neonatal nurses today are challenged not only to provide the best possible developmental care for a preterm infant but also to help the mother through an uncertain motherhood toward a feeling of being a real mother for her preterm infant. Despite receiving training by neonatal nurses, mothers of preterm infants encounter difficulties at home, hospital readmission rates increase and family life is disrupted **(Bowles et al., 2016).** The majority of governmental pediatric hospitals in Egypt prohibit mothers from providing care in NICUs, where preterm infants are hospitalized due to care safety and survival concerns. However, few studies in Egypt examined the effect of educational programs on mothers' knowledge and practice for their preterm infants who discharged from NICUs. The interactions between healthcare practitioners and parents of preterm infants are limited in Egyptian NICUs (**El-Hadary et al., 2020).**

Significance of the study:

Mothers are the greatest accountable persons to care for their preterm infants. Whereas mothers have less knowledge about their preterm infants' caring skills and less coping abilities. Too, they are usually dependent on others **(Padmavathi, 2011)**. Moreover, there is a high cost required for preterm infants' care. Where it is estimated that billions of dollars are the cost each year. However, it is increasing as the use of technology increases **(Shibi, 2014)**. So, educational intervention is very much important for independent mothers' care. While the mothers have not given proper care to the preterm infants, especially maintaining warmth, and have not followed prevention of infection techniques. Hence, the researchers have developed the educational intervention to improve the mothers' knowledge regarding caring skills and coping abilities to deal with their preterm infants.

Aim of the Study

This study aimed to investigate the effect of educational intervention on preterm infant's mothers' knowledge regarding their caring skills and coping abilities.

Operational definitions:

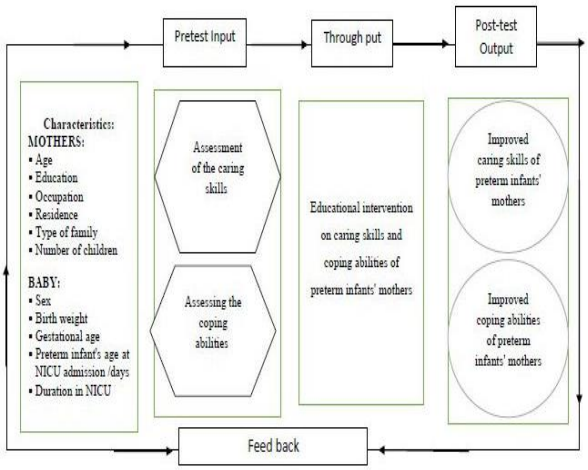
Caring skills:

The skills that mothers are having to promote and support their preterm infant **(Shibi, 2014))**

Coping abilities:

It refers to behavioral and cognitive efforts which are problem-focused as well as emotion-focused. It's used by mothers to manage the excessive demand of caring skills and coping abilities of their preterm infants and measured through coping health inventory scale **(Shibi, 2014)).**

Conceptual framework:



Research Hypothesis

The educational intervention improves the mothers' knowledge regarding caring skills and enhances the coping abilities with their preterm infants.

Subjects and Methods

Study Design

A quasi-experimental (pre-post-test) research design was used in this study.

Study Setting

The study was conducted at the neonatal intensive care unit (NICU) in Assiut University Children Hospital. It has about 50 incubators to serve from El-Minia to the Red Sea governorate. Nearly, 166 high-risk neonates were the monthly admission. While about 1540 high-risk neonates were admitted during the 2020 year **(statistics retrieved from the medical records, 2020).**

Study Subjects

A convenience sample of 100 mothers with their preterm infants who admitted to the NICU during the study period with the following inclusion and exclusion criteria:

Inclusion Criteria: The study subjects were included mothers of a preterm infant who**:**

1. Had gestational age less than 37 weeks.
2. Admitted to the NICU during the study period.
3. Willing to participate in the study.

Exclusion Criteria: The study subjects were excluded mothers of a preterm infant who**:**

1. Had a confirmed diagnosis of congenital anomalies.
2. Known to be at risk for intraventricular hemorrhage.
3. Mothers with postpartum complications that inhibit their participation in the care of their preterm infants.

Sample size:

The sample size was calculated after the pilot study conduction using the following formula: **n = [DEFF*Np (1-p)]/ [(d^2/Z$^2_{1-\alpha/2}$*(N-1) + p*(1-p)]** DEFF (Design effect) = 1, N (population) = 390, p (Hypothesized %) = 10%+/-5, d (tolerated margin of error) = 0.05, Z (level of confidence) = 1.96, α (Alpha)= 0.05, n = [1*390*10%+/-5 (1-10%+/-5)/ [(0.05)^2/ (1.96)^{2}1-0.05*(390-1) + 10%+/-5 (1-10%+/-5)], n= 100

Tools of Data Collection

Three tools were used in this study:

Tool one: Preterm infants' and mothers' data: A structured interview questionnaire was designed especially to collect the required data for this study. It was included **two parts**:

Part 1: **Preterm Infants' mothers' data** as; age, education, occupation, residence, type of family and number of children.

Part 2: Preterm infants' data as; sex, birth weight, gestational age, age at NICU admission, and duration in NICU.

Tool two: Mothers' knowledge regarding the caring skills with their preterm infants: A structured interview questionnaire. It was adapted after a thorough review of literature from previous research by **[Shibi, 2014].** It consisted of 20 multiple choice questions used to assess the caring skills of mothers for their preterm infants. Questions covered various aspects of caring skills such as preterm infants' definition (e.g. Definition of full term/months, average weight of newborn, definition of preterm infant, definition of low birth weight neonate, common cause of preterm birth, etc.…..) infection control (e.g. The most effective way of preventing infection in preterm infants), feeding (e.g. Which provides first immunity to the preterm infants?, ideal feed to your preterm infant, numbers of feeds a preterm infant need per day), kangaroo care (e.g. Importance of kangaroo care, Which is helpful to produce more breast milk?). Each correct answer was given one mark and the wrong answer was given zero mark. The mothers' knowledge was considered accurate according to the literature. The maximum score was 20 and minimum score was zero. According to **[Rashwan et al., 2014]** the mothers' knowledge about practice was scored as follow: Poor = <50% (less than 10 score). Average = 50-65% (10 to less than 13 score). Good= ≥65% (13 score and more).

Tool three: Coping health inventory for parents (CHIP) scale: The CHIP was adapted from **McCubbin et al. (1996)** to assess the mother's perception of coping strategies that would be used to manage family life when they had a seriously or chronically ill child. It has consisted of 42 items using a Likert scale of 4 points from 0-3; while 0 indicated "not helpful" and 3 indicated "extremely helpful". CHIP scores are obtained by summing across all items: Higher scores indicating greater parental reliance on efforts to increase family growth, stability and efficacy. Level of coping: Adaptive (>50%) and Non Adaptive (≤50%). The scale used to measure three coping abilites as follows: (I) Family integration, co-operation, and an optimistic definition of the situation: It consists of 16 coping strategies that focus on strengthening family life and relationships and the parents' outlook on life with a chronically ill child. (II) Maintaining social support, self-esteem, and psychological stability: It composes of 18 coping strategies that involve the parents' efforts to develop relationship with others engage in activities that enhance feelings of individual identity and self-worth plus strategies to manage psychological tensions and pressures. (III) Understanding the health care situation through communication with other parents and consultation with the health care team: It contains 8 coping strategies directed at the parents' relationships with the health care professionals and other parents of chronically ill children. Internal reliabilities range from .79 to .71 and evidence on the validity of the scale is extensive **(McCubbin et al., 1996).**

Method of Data Collection

- **An official permission** was obtained from the head of NICU in Assiut University Children Hospital.
- **Study tools** were translated into Arabic language by the researchers and they were tested for their content **validity** index by five experts in the field of pediatric and maternity nursing. It was 0.83 and 0.78 for tool two and three. Also, **tools reliability** was done by using alpha - Cronbach's test which was 0.78 and 0.85 for tools two and three.
- **Ethical considerations:** A study proposal was prepared by the researchers and it was accepted from the Ethical Committee of the Faculty of Nursing. After that; written consent was obtained from the mothers who were willing to participate in the study, after clarifying the nature and purpose of the study. Confidentiality and anonymity were ensured. Also, the researchers confirmed that the research paper was following the common ethical principles in clinical research.
- **Pilot study:** The pilot study was applied to 10 mothers of preterm infants (10 %). It was done to assess the clarity and completeness of the tools and to determine the time involvement. According to the pilot study results; no modifications, omissions and/or additions were made. The mothers in the pilot study were included in the total sample.

The Educational intervention:

It had been designed by the researchers depending on the pertinent literary text. The aim of the intervention was to assess the mothers' knowledge regarding caring skills and coping abilities for their preterm infants before and after the intervention. The researchers used lecture and discussion as a method of teaching and giving booklet handouts. It was composed of teaching the mothers the care of their preterm infants concerning several aspects: e.g. respiratory and cardiac support, thermoregulation, feeding methods, kangaroo care, and infection control.

Field of the Work

The study was conducted from the beginning of June 2019 to the end of April 2020. Over a period of ten months. Data collection was done two days per week in the morning shift, for about 1-2 mothers /day who fulfilled the inclusion criteria. During the interview; the researchers first introduced themselves to the mothers and gave them background information about the study and explained the aim and method of the study. The researchers interviewed the study subjects in a teaching class in NICU. The study was implemented through three sessions for each mother: In the first session: The pretest was conducted on day 2 of a preterm infant's admission to NICU using the structured interview questionnaire and modified coping health inventory for parents to assess the caring skills and coping abilities of the mothers. Each mother took 15 to 30 minutes to complete the questionnaire. The second session was implemented on the 3rd day whereas the educational intervention was given it took about 20-30 minutes. The educational intervention contents were discussed in the booklet which contained colored pictures, posters, and PowerPoint in the students' teaching class. During the educational intervention application; the mothers were divided into five groups each group had 20 mothers. The third session was implemented after 7 days of preterm infant's discharge from NICU the post-test was conducted to assess the caring skills and coping abilities of mothers by using the same tools through mobile call.

Statistical design:

Data analysis was performed using SPSS 20 statistical software. The qualitative variables were described using frequency and percentages, and quantitative variables were described using range, mean, and standard deviation. Chi-square test and Pearson Correlation were used. P value <0.05 was considered significant.

Results

Table (1): Data of the studied mothers (N=100):

Mothers' data	No (100)	%
Mother's Age/years		
● Less than 20	6	6.0
● 21-35	79	79.0
● More than 35	15	15.0
Age (mean ± SD)	**29±4.2**	
Education of mothers		
● Illiterate	19	19.0
● Primary	10	10.0
● Secondary	54	54.0
● University	17	17.0
Occupation		
● Housewife	81	81.0
● Working	19	19.0
Residence		
● Urban	31	31.0
● Rural	69	69.9
Type of family		
● Nuclear family	69	69.0
● Extended family	31	31.0
Number of children		
● One child	25	25.0
● Two and more	75	75.0

Table (2): Preterm infants' data (N=100):

Preterm infants' data	No (100)	%
Sex:		
● Male	36	36.0
● Female	64	64.0
Birth weight/gm.		
● Less than 1000	19	19.0
● 1000-2000	42	42.0
● More than 2000	39	39.0
Birth weight's Mean	**1625.9 ± 515.5**	
Gestational age/weeks		
● Less than 32	33	33.0
● 32-34	37	37.0
● 35-37	30	30.0
Gestational age's Mean	**34 ±2.5**	
Preterm infant's age at ICU admission /days		
● Less than 5 days	79	79.0
● 5 days or more	21	21.0
Mean of preterm infant's age	**3.2±3.5**	
Duration in NICU:		
● Less than 7 days	27	27.0
● 7 days or more	73	73.0
Mean of duration in NICU	**8.7±5.2**	

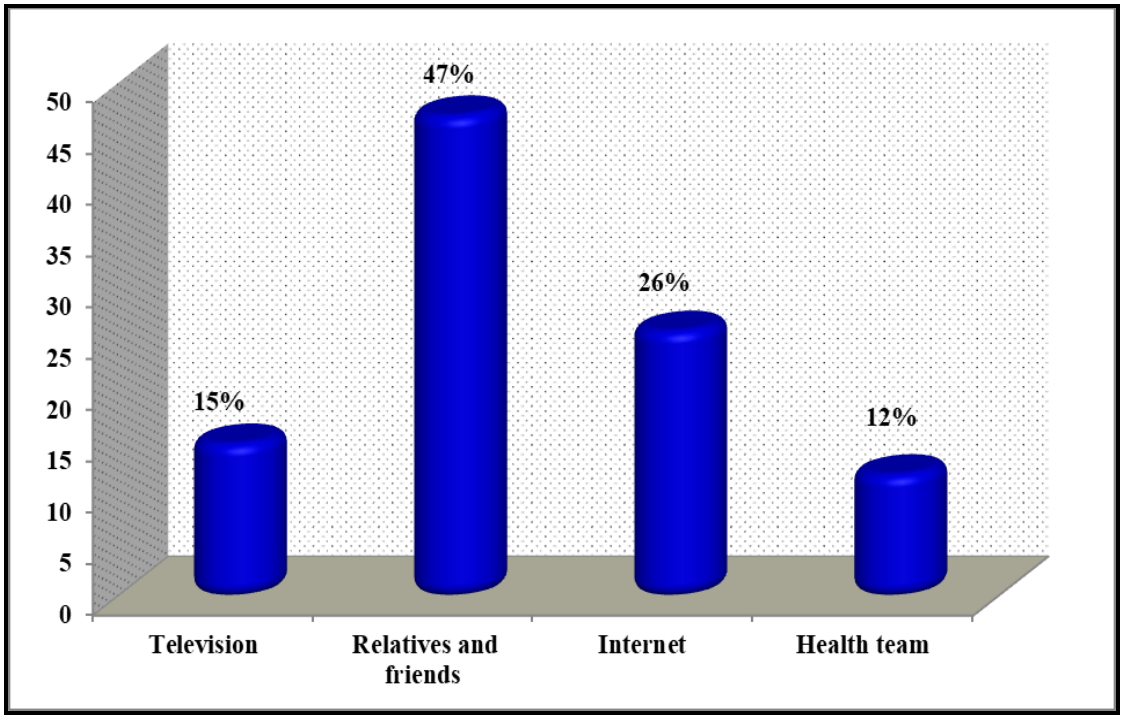
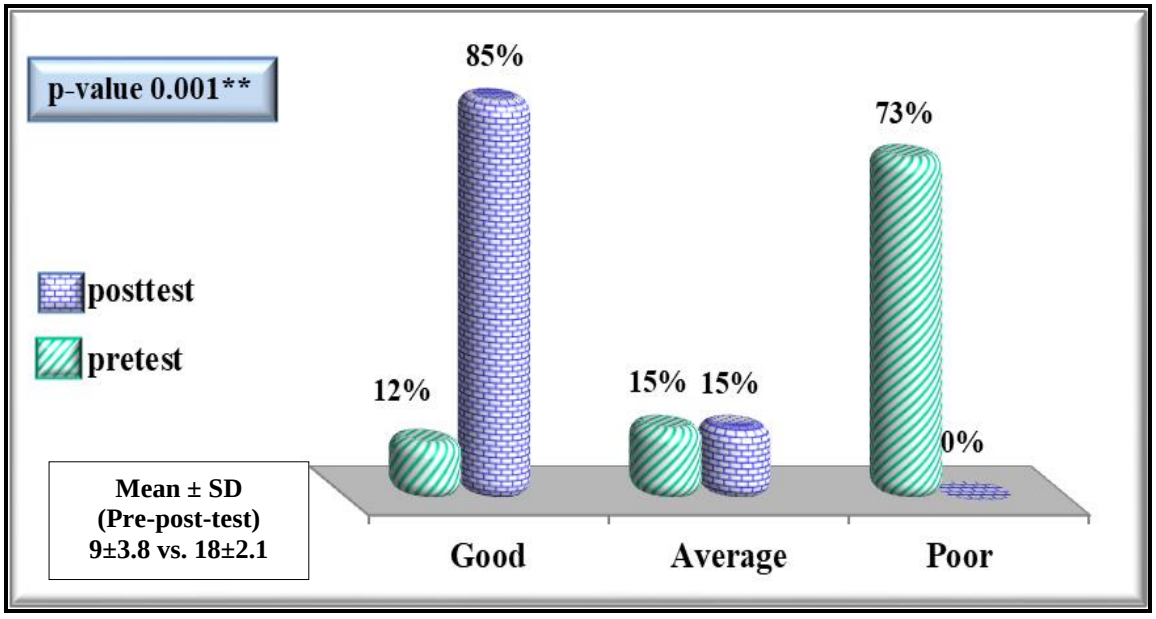


Fig (1): Sources of mothers' knowledge regarding caring skills for their preterm infants.

Table (3): Mothers' knowledge regarding caring skills for their preterm infants in the pre and post-test (N=100):

Knowledge	Correct knowledge regarding caring skills				
	Pretest		Posttest		P-value
	N(100)	%	N(100)	%	
1. Definition of full term/months	31	31.0	92	92.0	**0.001****
2. Average weight of newborn	25	25.0	91	91.0	**0.001****
3. Definition of preterm infant	29	29.0	96	96.0	**0.001****
4. Definition of low birth weight neonate	34	34.0	98	98.0	**0.001****
5. Common cause of preterm birth	33	33.0	99	99.0	**0.001****
6. Prevention of preterm birth	21	21.0	89	89.0	**0.001****
7. Why do preterm infants need special care?	20	20.0	91	91.0	**0.001****
8. Which provides first immunity to the preterm infants?	30	30.0	98	98.0	**0.001****
9. What is relevant to breastfeeding?	45	45.0	99	99.0	**0.001****
10. Ideal feed to preterm infants	51	51.0	98	98.0	**0.001****
11. Numbers of feeds a preterm infant need per day?	42	42.0	99	99.0	**0.001****
12. When the mother is unable to feed following C.S the best feed for the preterm infant will be?	51	51.0	99	99.0	**0.001****
13. How frequently will you breastfeed your preterm baby?	41	41.0	97	97.0	**0.001****
14. Which is helpful to produce more breast milk?	55	55.0	94	94.0	**0.001****
15. Importance of burping after feeding	37	37.0	95	95.0	**0.001****
16. Importance of kangaroo care	52	52.0	93	93.0	**0.001****
17. The most effective way of preventing infection in preterm infants	41	41.0	89	89.0	**0.001****
18. Ways to preserve the temperature of the preterm infants	53	53.0	99	99.0	**0.001****
19. What will happen if you are not changing the diaper?	61	61.0	98	98.0	**0.001****
20. How much weight will a preterm infant gain per day?	41	41.0	90	90.0	**0.001****

(**) highly statistically significant difference



(**) highly statistically significant difference

Figure (2): Mothers' total knowledge regarding their caring skills for their preterm infants in the pre and post-test (N=100).

Table (4): Relation between mothers' total knowledge regarding caring skills for their preterm infants and their data in the pre and post-test (N=100):

Mothers' data	Total knowledge in pretest			P-value1	Total knowledge in post-test		P-value2
	Good (12)	Average (15)	Poor (73)		Good (85)	Average (15)	
	No (%)	No (%)	No (%)		No (%)	No (%)	
Mother's Age							
● Less than 20 years	0(0.0)	2(33.3)	4(66.7)		4(66.7)	2(33.3)	
● 21-35years	3(3.8)	9(11.4)	67(84.8)	0.001**	68(86.1)	11(13.9)	0.003**
● More than 35yrs	9(60.0)	4(26.7)	2(13.3)		13(86.7)	2(13.3)	
Education of mothers							
● Illiterate	0(0.0)	1(5.3)	18(94.7)		7(36.8)	12(63.2)	
● Basic	1(10.0)	1(10.0)	8(80.0)	0.002**	7(70.0)	3(30.0)	0.001**
● Secondary	3(5.6)	8(14.8)	43(79.6)		54(100.0)	0(0.0)	
● University	8(47.1)	5(29.4)	4(23.5)		17(100.0)	0(0.0)	
Occupation							
● Housewife	4(4.9)	10(12.3)	67(82.8)	0.001**	71(87.7)	10(12.3)	0.003**
● Working	8(42.1)	5(26.3)	6(31.6)		14(73.7)	4(26.3)	
Residence							
● Urban	9(29.1)	5(16.1)	17(54.8)	0.007**	25(80.6)	6(19.4)	0.228
● Rural	3(4.3)	10(14.5)	56(81.2)		60(86.9)	9(13.1)	
Type of family							
● Nuclear family	8(11.6)	9(13.0)	52(75.4)	0.417	59(85.5)	10(14.5)	0.724
● Extended family	4(12.9)	6(19.4)	21(67.7)		26(83.7)	5(16.3)	
Number of children							
● One child	1(4.0)	3(12.0)	21(84.0)	0.017**	19(76.0)	6(24.0)	0.027*
● Two and more	11(14.7)	12(16.0)	52(69.3)		66(88.0)	9(12.0)	

P-value1 between mother data and total knowledge in pretest

P-value2 between mother data and total knowledge in post-test

(**) highly statistically significant difference *(*) statistically significant difference*

Table (5): Mothers' coping abilities regarding family integration, cooperation, and an optimistic definition of the situation in the pre and posttest (N=100).

Coping abilities		Coping abilities				
		Extremely Helpful	Moderately Helpful	Minimally Helpful	Not Helpful	P-value
		N (%)	N (%)	N (%)	N (%)	
1.Believing that my child will get better	Pretest	11(11.0)	21(21.0)	49(49.0)	19(19.0)	**0.001****
	posttest	59(59.0)	26(26.0)	12(12.0)	3(3.0)	
2. Doing things with my children	Pretest	9(9.0)	25(25.0)	44(44.0)	22(22.0)	**0.001****
	posttest	63(63.0)	18(18.0)	14(14.0)	5(5.0)	
3. Building a closer relationship with my spouse	Pretest	12(12.0)	24(24.0)	39(39.0)	25(25.0)	**0.001****
	posttest	47(47.0)	19(19.0)	28(28.0)	6(6.0)	
4. Doing things with family relatives	Pretest	8(8.0)	20(20.0)	41(41.0)	31(31.0)	**0.001****
	posttest	52(52.0)	29(29.0)	10(10.0)	9(9.0)	
5. Believing that my child is getting the best medical care possible	Pretest	10(10.0)	25(25.0)	50(50.0)	15(15.0)	**0.001****
	posttest	70(71.0)	10(10.0)	16(16.0)	3(3.0)	
6. Doing things related to my child together as a family (involving all members of the family)	Pretest	7(7.0)	25(25.0)	40(40.0)	28(28.0)	**0.001****
	posttest	68(68.0)	14(14.0)	8(8.0)	10(10.0)	
7. Providing food to my baby in terms of breast milk	Pretest	6(6.0)	15(15.0)	48(48.0)	31(31.0)	**0.001****
	posttest	53(53.0)	10(10.0)	28(28.0)	9(9.0)	

Coping abilities		Coping abilities				
		Extremely Helpful	Moderately Helpful	Minimally Helpful	Not Helpful	P-value
		N (%)	N (%)	N (%)	N (%)	
8. Purchasing gift myself and/or other family members	Pretest posttest	8(8.0) 48(48.0)	27(27.0) 30(30.0)	40(40.0) 17(17.0)	25(25.0) 5(5.0)	**0.001****
9. Providing KMC to my baby at times when I am not in work at home	Pretest posttest	10(10.0) 62(62.0)	20(20.0) 12(12.0)	45(45.0) 22(22.0)	25(25.0) 4(4.0)	**0.001****
10. Talking to someone (not professional counselor/ doctor) about how I feel	Pretest posttest	5(5.0) 45(45.0)	30(30.0) 33(33.0)	52(52.0) 13(13.0)	13(13.0) 9(9.0)	**0.001****
11. Building close relationship with people	Pretest posttest	6(6.0) 72(72.0)	26(26.0) 16(16.0)	50(50.0) 6(6.6)	18(18.0) 5(5.0)	**0.001****
12. Talking with other parents in the same type of situation and learning about their experiences	Pretest posttest	25(25.0) 61(61.0)	33(33.0) 24(24.0)	31(31.0) 12(12.0)	11(11.0) 3(3.0)	**0.001****
13. Reading more about the medical problem which concerns me	Pretest posttest	10(10.0) 52(52.0)	25(25.0) 34(34.0)	50(50.0) 30(30.0)	15(15.0) 2(2.0)	**0.001****
14. Being sure prescribed medical treatments for children are carried out at home on a daily basis.	Pretest posttest	12(12.0) 77(77.0)	30(30.0) 10(10.0)	37(37.0) 5(5.0)	21(21.0) 8(8.0)	**0.001****
15. Talking with other individuals /parents in my same situation	Pretest posttest	8(8.0) 51(51.0)	30(30.0) 24(24.0)	29(29.0) 19(19.0)	33(33.0) 6(6.0)	**0.001****
16. Talking with the doctor about my concerns about my children with the medical condition	Pretest posttest	11(11.0) 81(81.0)	29(29.0) 8(8.0)	34(34.0) 10(10.0)	26(26.0) 1(1.0)	**0.001****

(**) highly statistically significant difference

Table (6): Mothers' coping abilities regarding social support, self-esteem, and psychological stability in the pre and posttest (N=100):

Coping abilities		Coping abilities				
		Extremely Helpful	Moderately Helpful	Minimally Helpful	Not Helpful	P-value
		N (%)	N (%)	N (%)	N (%)	
1.Investing myself in my children	Pretest posttest	12(12.0) 62(62.0)	20(20.0) 17(17.0)	27(27.0) 11.(11.0)	41(41.0) 10(10.0)	**0.001****
2. Believing that things will always work out	Pretest posttest	8(8.0) 57(57.0)	19(19.0) 21(21.0)	42(42.0) 10(10.0)	31(31.0) 12(12.0)	**0.001****
3. Talking over personal feelings and concerns with spouse	Pretest posttest	6(6.0) 78(78.0)	29(29.0) 10(10.0)	20(20.0) 8(8.0)	35(35.0) 4(4.0)	**0.001****
4. Believing in god	Pretest posttest	88(88.0) 97(97.0)	4(4.0) 2(2.0)	6(6.0) 1(1.0)	2(2.0) 0(0.0)	**0.082**
5. Trying to maintain family stability	Pretest posttest	9(9.0) 78(78.0)	18(18.0) 8(8.0)	52(52.0) 12(12.0)	21(21.0) 2(2.0)	**0.001****
6. Trusting my spouse to help support me and my children	Pretest posttest	32(32.0) 88(88.0)	23(23.0) 6(6.0)	30(30.0) 4(4.0)	15(15.0) 2(2.0)	**0.001****
7. Having my child with the medical condition seen at the clinical hospital on a regular basis	Pretest posttest	12(12.0) 62(62.0)	27(27.0) 19(19.0)	41(41.0) 15(15.0)	20(20.0) 4(4.0)	**0.001****
8. Encouraging children with medical condition to be more independent	Pretest posttest	10(10.0) 52(52.0)	22(22.0) 32(32.0)	52(52.0) 6(6.0)	16(16.0) 10(10.0)	**0.001****
9. Preparing myself to meet any situation	Pretest posttest	17(17.0) 63(63.0)	30(30.0) 20(20.0)	41(41.0) 11(11.0)	12(12.0) 6(6.0)	**0.001****
10. Sleeping	Pretest	10(10.0)	17(17.0)	45(45.0)	28(28.0)	**0.001****

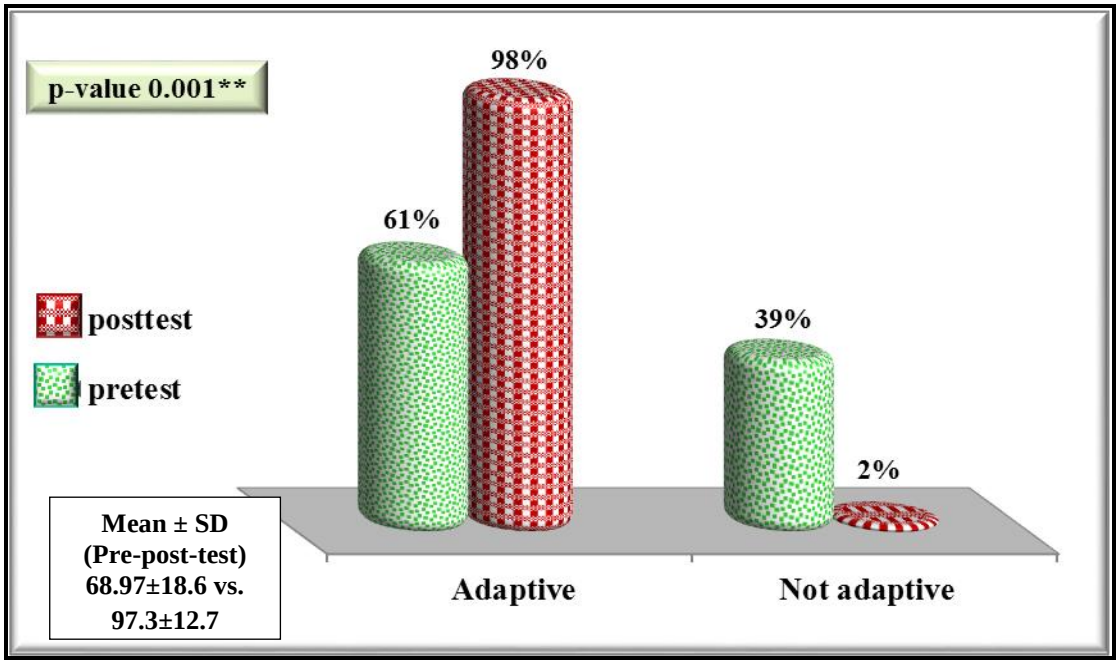
Coping abilities		Coping abilities				
		Extremely Helpful	Moderately Helpful	Minimally Helpful	Not Helpful	P-value
		N (%)	N (%)	N (%)	N (%)	
	posttest	58(58.0)	25(25.0)	8(8.0)	10(10.0)	
11. Concentrating on hobbies (art, music etc...)	Pretest posttest	10(10.0) 70(71.0)	25(25.0) 10(10.0)	50(50.0) 16(16.0)	15(15.0) 3(3.0)	**0.001****
12. Becoming more self-reliant and well groomed	Pretest posttest	19(19.0) 71(71.0)	16(16.0) 17(17.0)	51(51.0) 10(10.0)	14(14.0) 2(2.0)	**0.001****
13. Engaging in relationships and friendships which help to feel important and appreciated	Pretest posttest	12(12.0) 67(67.0)	23(23.0) 19(19.0)	53(53.0) 12(12.0)	11(11.0) 2(2.0)	**0.001****
14. Entertaining friends in our home	Pretest posttest	5(5.0) 45(45.0)	30(30.0) 33(33.0)	52(52.0) 13(13.0)	13(13.0) 9(9.0)	**0.001****
15. Investing time and energy in my job	Pretest posttest	10(10.0) 53(53.0)	28(28.0) 12(12.0)	48(48.0) 27(27.0)	14(14.0) 8 (8.0)	**0.001****
16. Developing myself as important in my child health care	Pretest posttest	9(9.0) 61(61.0)	30(30.0) 26(26.0)	51(51.0) 10(10.0)	10(10.0) 3(3.0)	**0.001****
17. Talking with the medical staff (nurse's social workers etc...) when we visit the medical center	Pretest posttest	8(8.0) 51(51.0)	30(30.0) 24(24.0)	29(29.0) 19(19.0)	33(33.0) 6(6.0)	**0.001****
18. Explaining our family situation to friends and neighbors so they will understand	Pretest posttest	33(33.0) 87(87.0)	25(25.0) 6(6.0)	29(29.0) 5(5.0)	13(13.0) 2(2.0)	**0.001****

(**) highly statistically significant difference

Table (7): **Coping abilities regarding understanding the health care situation through communication in pre and posttest (N=100):**

Coping abilities		Coping abilities				
		Extremely Helpful	Moderately Helpful	Minimally Helpful	Not Helpful	P-value
		N (%)	N (%)	N (%)	N (%)	
1.Telling myself that I have manythings I should be thankful for	Pretest posttest	6(6.0) 78(78.0)	29(29.0) 10(10.0)	20(20.0) 8(8.0)	35(35.0) 4(4.0)	**0.001****
2. Taking good care of all the medical equipment at home	Pretest posttest	11(11.0) 58(58.0)	24(24.0) 20(20.0)	33(33.0) 12(12.0)	32(32.0) 10(10.0)	**0.001****
3. Showing that I am strong	Pretest posttest	9(9.0) 62(62.0)	18(18.0) 22(22.0)	55(55.0) 9(9.0)	18(18.0) 7(7.0)	**0.001****
4. Involvement in social activities with friends	Pretest posttest	12(12.0) 67(67.0)	23(23.0) 19(19.0)	53(53.0) 12(12.0)	11(11.0) 2(2.0)	**0.001****
5. Allowing myself to get angry	Pretest posttest	11(11.0) 59(59.0)	21(21.0) 26(26.0)	49(49.0) 12(12.0)	19(19.0) 3(3.0)	**0.001****
6. Keeping myself in shape and well groomed	Pretest posttest	10(10.0) 63(63.0)	26(26.0) 9(9.0)	30(30.0) 6(6.0)	34(34.0) 12(12.0)	**0.001****
7. Going out with my spouse on a regular basis	Pretest posttest	10(10.0) 52(52.0)	22(22.0) 32(32.0)	52(52.0) 6(6.0)	16(16.0) 10(10.0)	**0.001****
8. Reading about how other persons' in my situation handle things	Pretest posttest	9(9.0) 78(78.0)	18(18.0) 8(8.0)	52(52.0) 12(12.0)	21(21.0) 2(2.0)	**0.001****

(**) highly statistically significant difference



(**) highly statistically significant difference

Figure (3): Total level of mothers' coping abilities in pre and post-test (N=100).

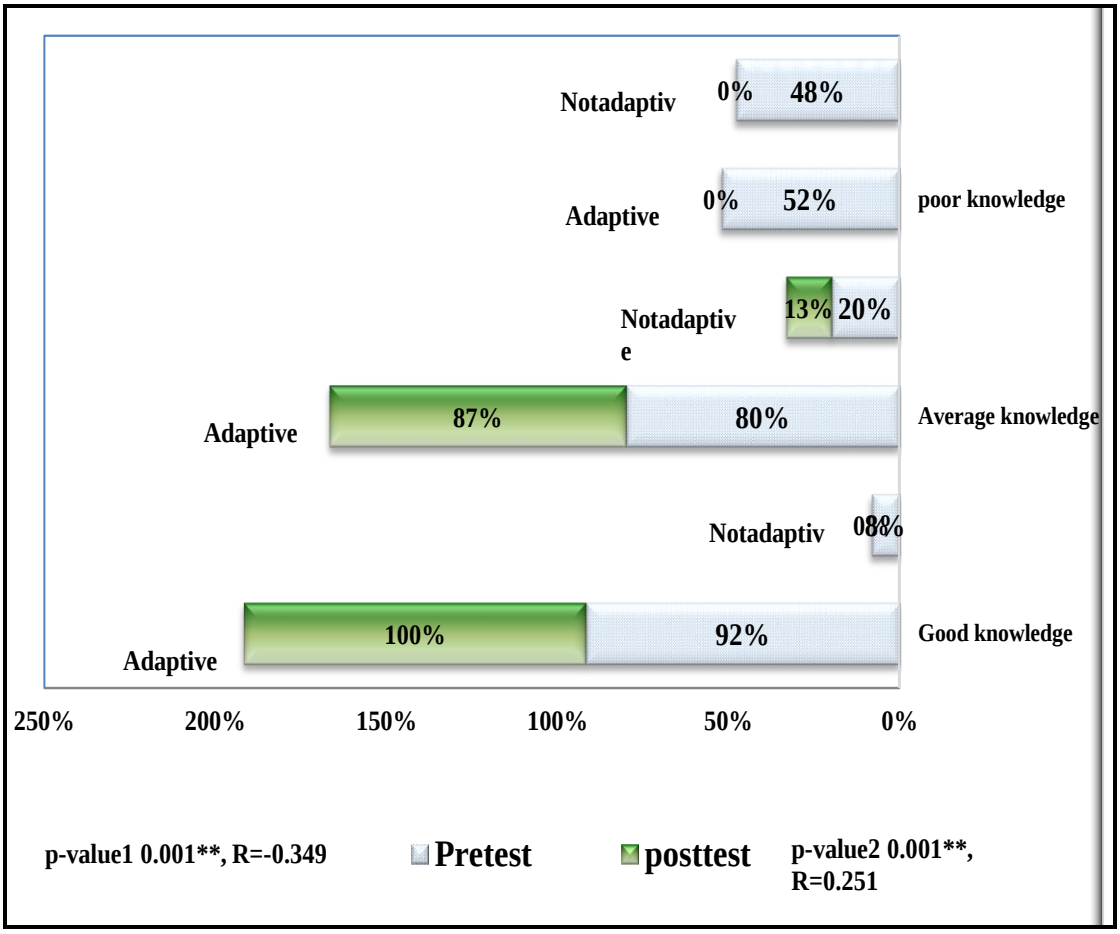
Table (8): **Relation between level of mothers' coping abilities and their data in pre and post-test (N=100)**

Mothers' data	Level of mothers ' coping in pretest		P-value1	Level of mothers ' coping in post-test		P-value2
	Adaptive (61)	Not adaptive (39)		Adaptive (98)	Not adaptive (2)	
	No (%)	No (%)		No (%)	No (%)	
Mother's Age						
• Less than 20 years	2(33.3)	4(66.7)		5(83.3)	1(16.7)	
• 21-35years	48(60.8)	31(39.2)	0.001**	78(98.7)	1(1.3)	0.002**
• More than 35yrs	11(73.3)	4(26.7)		15(100.0)	0(0.0)	
Education of mothers						
• Illiterate	9(47.4)	10(52.6)		17(89.5)	2(10.5)	
• Basic	3(30.0)	7(70.0)	0.007**	10(100.0)	0(0.0)	0.004**
• Secondary	40(74.1)	14(25.9)		54(100.0)	0(0.0)	
• University	9(52.9)	8(47.1)		17(100.0)	0(0.0)	
Occupation						
• Housewife	45(55.6)	36(44.4)	0.001**	79(97.5)	2(2.5)	0.112
• Employed	16(84.2)	3(15.8)		19(100.0)	0(0.0)	
Residence						
• Urban	17(54.8)	14(45.2)	0.002**	30(96.8)	1(3.2)	0.396
• Rural	44(63.8)	25(36.2)		68(98.6)	1(1.4)	
Type of family						
• Nuclear family	47(68.1)	23(31.9)	0.001**	69(98.6)	1(1.4)	0.375
• Extended family	14(45.2)	16(54.8)		29(96.7)	1(3.3)	
Number of children						
• One child	9(36.0)	16(64.0)	0.002**	24(96.0)	1(4.0)	0.235
• Two and more	52(69.3)	23(30.7)		74(98.7)	1(1.3)	

P-value1 between mother data and level of mothers ' coping in pretest

P-value2 between mother data and level of mothers ' coping in post-test

(**) highly statistically significant difference



P-value1 between total knowledge and level of mothers ' coping in pretest
P-value2 between total knowledge and level of mothers ' coping in post-test
(**) highly statistically significant difference

Figure (4): Correlation between level of mothers' coping abilities and their total knowledge level regarding caring skills in pre and post-test (N=100).

Table (1): Showed that 79.0 % of the mothers their ages ranged from 21-35 years (mean age: 29±4.2). Also, 54.0% of mothers graduated from secondary school and 81.0% were housewives. Moreover, 69.9% resided in rural areas, and 69.0 % came from nuclear families. Finally, 75.0 % of the studied mothers had two children and more.

Table (2): Illustrated that 64.0 % of the preterm infants' were females. As regards the birth weight, it was found 42.0% had from 1000 to 2000 grams (mean 1625.9 ± 515.5). In addition, 37.0 % had gestational age ranged from 32-34 weeks (mean 34 ±2.5). Moreover, 79.0% of them their ages were less than 5 days at the onset of admission to NICU and 73.0% stayed at NICU seven days or more.

Figure (1): Revealed that 47 % of the studied mothers' sources of knowledge were from relatives and friends and 26% of mothers obtained the knowledge from the internet. While only 15 and 12% of mothers' sources of knowledge were from television and health teams respectively.

Table (3): Illustrated that highly statistically significant differences were detected between the mothers' knowledge regarding caring skills for their preterm infants in the pre and post-test (P=0.001** respectively regarding all items).

Figure (2): Demonstrated that only 12 % of the studied mothers had good score of knowledge in pretest which increased significantly to 85% in posttest with a statistically significant difference between pre and post-test (P=0.001).

Table (4): Represented that there were highly statistically significant differences between the mothers' age, education, occupation, residence, and number of children and the total knowledge regarding caring skills of mothers in pretest

(P=0.001**,0.002**0.001**,0.007** and 0.017**) respectively. In addition, statistically significant differences were detected as regards the mothers' age, education, occupation, and the number of children (p = 0.003**, 0.001**, 0.003**, 0.027*) respectively in post-test and the mothers 'total score of knowledge regarding their caring skills.

Table (5): Reveled that highly statistically significant differences were detected between mothers' coping abilities regarding family integration, cooperation, and an optimistic definition of the situation in pre and posttest (P=0.001** respectively regarding all items).

Table (6): Indicated that highly statistically significant differences were noticed between mothers' coping abilities regarding social support, self-esteem, and psychological stability in the pre and posttest (P=0.001** respectively regarding the most items).

Table (7): Demonstrated that highly statistically significant differences were identified between mothers' coping abilities regarding understanding the health care situation through communication in the pre and posttest (P=0.001** respectively regarding all items).

Figure (3): Demonstrated that 61% of the mothers their coping abilities were adaptive in pretest increased significantly to 98% in posttest (P=0.001).

Table (8): Indicated that highly statistically significant differences were detected between the level of mothers' coping abilities and their data in pretest (p=0.001**, 0.007**, 0.001**, 0.002**, 0.001**, 0.002**) respectively. While a highly statistically significant difference was detected as regards the mothers' age and occupation in post-test (p = 0.002** and 0.004**) respectively.

Figure (4): Clarified that there was a statistically negative correlation between level of mothers' coping abilities and their total knowledge level regarding caring skills in the pretest (R=-0.349, 0.001**). While there was a statistically positive correlation between the level of mothers' coping abilities and their total knowledge level regarding caring skills in the post-test (R=0.251, 0.001**).

Discussion

Worldwide, prematurity remains the first cause of neonatal mortality. Mothers of newborn infants who admitted to the NICU need lots of information to engage in the treatment process and supportive care (**AL-Mukhtar & Abdulghani**, **2020).** Likewise, reducing preterm infants' mortality rate is associated with an increase in their care needs. Insufficient knowledge of mothers and ineffective care of preterm infants affects their growth and development, causes illness, and re-admission to the NICU **(Arzani et al 2017).** So, this study was aimed to investigate the effect of educational intervention on preterm infant's mothers' knowledge regarding their caring skills and coping abilities.

The present study indicated that nearly half of studied mothers' sources of knowledge were from relatives and friends and about one-fourth of mothers obtained their knowledge from the internet. While only near one-eighth of mothers' sources of knowledge was from television and health teams. No previous study mentioned the mothers' sources of knowledge regarding the caring skills of preterm. Whereas some studies in pediatric nursing agreed with the study results; **Hassan et al. (2018)** indicated that friends, relatives, and neighbors were the main sources of information for mothers concerning medication use. This result could be explained that there are inadequate awareness programs introduced by the health teams or public awareness through mass media (television). While there was an intimate relationship between the mothers and their relatives and friends.

The current study results demonstrated that there were highly statistically significant differences detected in the pre and post-test between the mothers' knowledge regarding caring skills for their preterm infants. These findings were concurrent with **Jang & Ju (2020) & Shibi (2014). Also, Shrishail et al. (2015)** found a significant increase in mothers' knowledge after the program application. This could be explained that the educational intervention was effective to increase the mothers' knowledge regarding caring skills in caring for their preterm infants. Because it was a direct method for teaching of the mothers, also due to the mothers' eagerness to maintain high care for their preterm infants.

The study results revealed that the majority of mothers had poor knowledge regarding caring skills of their preterm infants in pretest which was increased significantly in the post-test after the program application and this denoted the positive effects of the educational intervention on the mothers' knowledge during care of preterm infants. This was consistent with **Jang & Ju (2020), Shin et al (2018), Guirguis and Farahat (2015) & Rungtiwa et al (2012)**. However, the current study findings contradicted with **Galeano & Carvajal (2016)** showed that interventions were not effective for mothers in caring for their preterm infants at home. The researchers explained that the planned educational intervention would positively increase the mothers' knowledge during care of their preterm infants.

Regarding mothers' coping abilities; the results demonstrated that highly statistically significant differences were identified between mothers' coping abilities regarding family integration, cooperation, optimistic definition of the situation social support, self-esteem, psychological stability, and understanding of the health care situation through

communication in the pre and posttest**.** These results were supported by **Shibi (2014)**. The researchers viewed that the positive effect of the educational intervention on mothers' knowledge regarding caring skills for their preterm infants directly improved the mothers' coping abilities.

In addition, the present findings demonstrated that near two-thirds of mothers had adaptive coping abilities regarding care of their preterm infant in pretest increased significantly to near all mothers in post-test after the program application. This result was continuous with the finding of **Shibi (2014)** who indicated that there was a highly significant difference as regards mothers' coping abilities before and after the educational intervention implementation. The finding of the evidenced structured teaching program was effective and it was increasing the knowledge of the postnatal mothers regarding the management of preterm infants.

Moreover, the current study clarified that there was a statistically negative correlation between the level of mothers' coping abilities and their total knowledge level regarding caring skills in the pretest. While there was a statistically positive correlation between the level of mothers' coping abilities and their total knowledge level regarding caring skills in the post-test. This result was concurrent with the results of **Ebrah & Yousif (2020) & Shibi (2014)** who showed that there was a positive correlation between the caring skills and coping abilities of mothers with preterm infants after the educational intervention implementation.

This could be explained by that the enhancement of mothers' caring skills were giving them the necessary knowledge and skills to adapt to this crisis of preterm infants' care and were improving their coping abilities. Too, the educational intervention helped in providing knowledge for preparing the mothers to provide the care to their preterm infants. So, the educational intervention was motivated the mothers to give better care to their preterm infants.

The present study showed that there was a significant relation between mothers' knowledge and coping abilities and their education and age in the pre and post-test. This finding was in agreement with **AL-Mukhtar & Abdulghani (2020)** who found that the mothers' knowledge and coping abilities concerning premature infant's health showed a significant positive correlation with mothers' education and age. Regarding type of family; more than two-thirds of mothers were living in nuclear family and about one-third were living in extended family this was agreed with **Shibi (2014)** who showed that the majority of mothers were from nuclear family and more than one-third from joint family.

Conclusion:

The current study results denoted that the planned educational intervention would positively increase the mothers' knowledge about caring skills and had adaptive coping abilities during care of their preterm infants.

Recommendations:

At present, there are no standardized protocols for follow-up care of preterm infants in Egypt. Consequently, preterm infants may leave the hospital without follow-up care plans to known mothers to ensure appropriate and adequate care at home. Based on the results in this study, it is recommended that educational programs for mothers about caring for their preterm infants should be included in clinical routine care and clinical care policy should be established to support the use of discharge education programs to benefit preterm infants and their families. In addition; the NICUs should be added a plan of care for improving the nurses' knowledge and practice regarding caring skills and coping abilities of mothers during care of their preterm infants.

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