Nurses' Performance regarding Care of Infant Suffering from Hypoxic Ischemic Encephalopathy: An Educational Program

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Abstract

Background: Hypoxic-ischemic encephalopathy is one of the most common causes of cerebral palsy and other severe neurological deficits in children which occurs in 1.5/1000 live births. It is caused by inadequate blood flow and oxygen supply to the brain resulting in focal or diffuse brain injury. **Aim:** This study aimed to evaluate the effect of educational program on nurses' performance regarding infant suffering from hypoxic ischemic encephalopathy. **Method:** A quasi-experimental design was utilized to conduct this study. **Setting**: The study was conducted in the pediatric intensive care unit and neonate intensive care unit department at Specialized Pediatric Hospital which affiliated to Egyptian Ministry of Health and Population. **Subjects:** A convenient sample of 60 nurses and purposive sample of 60 infants. **Tools:** Three tools were used to collect data: A structured interviewing questionnaire sheet, an observation checklist and nurses' attitude scale **Results:** Less than half, less than one third and more than one third respectively of nurses had poor knowledge, incompetent practices and negative attitude levels pre- program implementation. While, the majority of them had good knowledge, competent practices and positive attitude levels post- program implementation. **Conclusion:** The educational program had a significant positive effect in improving nurses' performance regarding care of infant suffering from hypoxic ischemic encephalopathy. Besides, there was a highly statistical significant positive correlation between total nurses' practices, total knowledge and total attitude scores post program implementation. **Recommendations:** Designing a simplified comprehensive Arabic guided booklet about hypoxic ischemic encephalopathy must be available in all pediatric intensive care unit and neonate intensive care unit.

Keywords: Educational Program, hypoxic ischemic encephalopathy, infant, nurses, performance.

Introduction

. Hypoxic ischemic encephalopathy is a type of brain damage that occurs when an infant's brain and others organs doesn't receive enough oxygen (hypoxia) and blood (ischemia). Hypoxia eventually leads to a decrease in fetal cardiac output, which reduces cerebral blood flow. This produces injury to the basal ganglia and thalami. The decreased cerebral blood flow reduces the delivery of oxygen and glucose to the brain, which leads to anaerobic metabolism leads to intracellular accumulation of sodium, water, and calcium. Thus, may lead to more cellular damage **(Wang, et al., 2021).**

Hypoxic ischemic encephalopathy (HIE) is one of the most serious birth complications affecting infant. It occurs in 1.5 to 2.5 per 1000 live births in developed countries. HIE is a brain injury that inadequate blood flow to the infant's brain occurring as a result of a hypoxic-ischemic event during the prenatal, intrapartum or postnatal period. By the age of 2 years, up to 60% of infants with HIE will die or have severe disabilities including mental retardation, epilepsy, and cerebral palsy **(Van et al., 2019)**.

Infant hypoxic ischemic encephalopathy can be caused by a variety of medical complications around the time of prenatal,

birth asphyxia or postnatal. Prenatal problems include abnormal uterine contractions, abruption of the placenta and preeclampsia. Problems that occur with delivery involve bleeding from the placenta, low blood pressure, umbilical cord problems, rupture of the uterus. In addition, severe lung or heart disease, cardiac arrest, major infection and congenital brain malformation (**Mohsenpour, et al., 2021)**.

Symptoms of hypoxic ischemic encephalopathy often depend on the severity and extent of the brain injury, as well as the areas of the brain that were affected. Infants born with HIE may be floppy and unreactive to sights or sounds.

Alternatively, some infant with HIE are very tense and react more to stimulation than a healthy newborn, have abnormal movements or seizures, have feeding problems due to weak muscles in their mouth and throat, have a weak cry and show signs of organ dysfunction, especially of the heart, lungs, kidneys, liver and blood **(Nair, et al., 2018).**

Very important that infant with HIE receive intensive early intervention in order to minimize health issues and maximize function. Exact treatment regimens will vary based on what parts of the brain were affected (and to what extent) by the oxygen deprivation. For example, an infant with intellectual disabilities will require different types of intervention than one whose impairments are mainly or exclusively physical. Infant with HIE may develop a variety of associated conditions, such as cerebral palsy and epilepsy, which will also require treatment **(Mateos, et al., 2019).**

Reducing this risk, infants with moderate or severe HIE are likely to receive a treatment called therapeutic hypothermia or cooling, which needs to be started within the first 6 hours after birth. A special cooling mattress is used to lower the infant's temperature between 33 - 34 degrees centigrade for 72 hours. Temperature will be monitored closely to ensure that infant stays at the right temperature and cooling will usually be continued for 72 hours before rewarming. During the cooling period, the health team will also closely monitor heart rate and blood pressure, perform blood tests, monitor medication and give pain relief if needed (**Basiri & Sabzehei,2021).**

Pediatrics Nurse should assess clinical manifestation of hypoxic ischemic encephalopathy as low Apgar score, metabolic acidosis in cord blood. Nursing intervention should be emphasized on providing rest, comfort, relive pain by analgesic, maintain fluid and electrolyte balance by IV fluid therapy according to intake and output and also monitoring blood glucose. Nursing care is able to meet needs that go beyond direct assistance to pathology, strengthening the relationship and providing the bond with parents trying to reassure them **(Segur, et al., 2019).**

So, nursing education program regarding hypoxic ischemic encephalopathy encompassing the knowledge, skill and attitude necessary for successful task performance. It is a necessity as it affects infant health, safety, decrease mortality rate, decrease incidence of bed ulcer and short length of hospital stays **(Basiri,B.& Sabzehei,2021).**

Significant of the study

Hypoxic-ischemic encephalopathy (HIE) is one of the most common causes of cerebral palsy (CP) and other severe neurological deficits in children. Neonatal HIE occurs in 1.5/1000 live births. It is caused by inadequate blood flow and oxygen supply to the brain resulting in focal or diffuse brain injury. According to the World Health Organization (WHO), perinatal asphyxia (PA) is among the three leading causes of death among neonates and 8% of deaths of children under 5 are directly associated with perinatal asphyxia **(Sanches & Rodriguez, 2019).**

Each year, out of every 1,000 live births, three to five will present perinatal asphyxia at birth, increasing the risks of neurological sequel. Of the live newborns who suffered asphyxiation at the time of delivery, 15% to 20% die even in the neonatal period and 25% of the survivors show permanent neurological disability as cerebral palsy, epilepsy and hyperactivity. The risk conditions associated with hypoxic-ischemic encephalopathy can develop during pregnancy, at the time of delivery or after birth, associated with low birth weight and prematurity **(Rivera, et al., 2017).**

According to **Salah et al., (2019)** the neonatal mortality rate from hypoxic ischemic encephalopathy in Egypt is 25 per 1000 live births. Moreover, approximately 120 children were diagnosed with hypoxic ischemic encephalopathy from November 2018 until November 2019 and approximately 200 children from January 2020 until January 2021 **(Benha specialized pediatric hospital statistic report, 2019&2022).** Therefore, application of education program to nurses of infant with hypoxic ischemic encephalopathy is highly required to increase their knowledge, practices and improve their attitudes about the disease to prevent problems at home.

Aim of the Study

The aim of this study was to evaluate the effect of education program on improving nurses' performance for infant suffering from hypoxic ischemic encephalopathy.

Research hypothesis:

- Nurses' performance will be improved after implementation of the educational program regarding hypoxic ischemic encephalopathy

Subjects and method

Research design:

A quasi-experimental research design was utilized to achieve the aim of this study.

Research Setting:

The study was conducted in Neonatal Intensive Care Units (NICUs) and Pediatric Intensive Care (PICU) at Benha Specialized Pediatric Hospital in Benha City, which affiliated to the Egyptian Ministry of Health and Population. The NICUs are located in the third and fifth floor of building. The NICU which is located in the third floor contain two rooms, one room had (31) incubators and the other room had (3) incubators while the NICU in the fifth floor contain one room which had (5) incubators, total numbers of nurses were 45 nurses. The PICU which located in the third floor and included 3 rooms (first room contains 10 beds, the second room contains 2 beds and the third room (isolation room) contains 1 bed), total numbers of nurses were 15 nurses. This hospital introduces services for all children from El-qalubia governorate.

Research Subjects:

The sample consisted of: -

Type (1): A convenient sample of 60 nurses who are working in the above-mentioned setting was taken during the period of the study regardless their gender, level of education and years of experience.

Type (2): A purposive sample of 60 neonates was selected from the above-mentioned setting after fulfilling the following criteria:

Inclusion criteria:

- Infant with moderate and mild hypoxic ischemic encephalopathy.
- Apgar score < 3 at one minute or < 6 at 5 minutes.
- Neonatal and infant post arrest > 10 minutes.

Exclusion criteria:

-Neonatal sepsis.

Tools of Data collection:

Data were collected through the following tools:

Tool (1): A structured Interviewing questionnaire sheet:

It was designed by the researcher after reviewing recent and related literatures. It was written in a simple Arabic language and includes the following parts: -

Part I- Characteristics of The Studied Nurses: This included data related to age, gender, educational level, years of experience, previous attendance of training courses regarding hypoxic ischemic encephalopathy.

Part II Characteristics of The Studied infant: This involved data related to gestational age, current age, mode of delivery, gender, weight at birth, weight on admission, current weight, and length of hospitalization.

Part III: Nurses' knowledge assessment: It designed by the researcher to assess nurses' knowledge regarding hypoxic ischemic encephalopathy, it consists of 10 Multiple-choice question related to definition (1question) causes (1question), clinical manifestation (1 question) risk factors (3 questions), investigation (1 question), treatment (1 question), and nursing role (2 questions).

Scoring system of nurses' knowledge:

Nurses' knowledge were evaluated upon completion of the interviewing questionnaire sheet as the studied nurses' knowledge was checked with model key answer and accordingly the complete correct answer was given two (2) degree, incomplete correct answer was given one (1) degree and zero (0) for incorrect or don't know answer. Total scores of knowledge ranged from (0-20) degree. In this respect, the level of nurses' knowledge was categorizing as poor knowledge (<60%) was ranged from 0<12 point, average knowledge (60 % - < 80%) was ranged from 12 <16 point and good knowledge (≥ 80 %) was ranged from ≥16 point.

Tool 2: An Observation Checklist:

It was adopted from **Bowden, (2020) and Conway et al., (2018)** to assess nurse's practices regarding hypoxic ischemic encephalopathy. It included 110 items grouped under 13 procedures: Vital signs (39 steps), body weight measurement (7 steps), blood sugar monitoring (9 steps) fluid chart (6 steps), skin turgor examination (8 steps), nasogastric tub feeding (9 steps), nasopharyngeal suction (10 steps), endotracheal suction (13 steps) and oxygen therapy (9 steps).

Scoring System of nurses' practices:

Total scores of nurses' practices were developed by the researcher. Each item was checked as one grade for done and zero for not done. Accordingly, the total practices level was classified as the following:

- Competent: ≥80% (≥88degree).
- Incompetent: < 80% (< 88degree).

Tool 3: Nurses' attitude scale: -

It was adopted from **Arnaez et al., (2018) and Browning et al., (2017)** to assess the nurses' attitude towards hypoxic ischemic encephalopathy. It included 20 items using 3 point Likert scale.

Scoring system of nurses' attitude:

Nurses' attitudes were classified into three point Likert scale as the following: agree (3), disagree (2), uncertain or neutral (1). The total scores were ranged from 20-60 degree and the level were classified as > 60% (>36) point was considered positive attitude while scores < 60% (<36) point was considered negative attitude.

Content validity:

Tools of data collection were translated into Arabic and investigated for their content validity by three experts' (one professor & two assistant professor) in the field of Pediatric Nursing specialty from Faculty of Nursing Benha university for ensuring content validity of the tools and to judge its clarity, relevance, comprehensiveness, understanding and applicability. The opinion was elicited

regarding the layout, format and sequence of the questions and all of their remarks were taken into consideration. Some items were rephrased to arrive at the final version of the tools. The tools were regarded as valid from the experts' point of view

Reliability of tool:

Reliability for tools was applied by the researcher for testing the internal consistency of the tools by administrating of the same tool to the same subjects under similar condition. Internal consistency reliability of all items of the tools was assessed using Cronbach's alpha coefficient test. It was (0.93) for structured interviewing questionnaire sheet, (0.91) for an observation checklist and (0.73) for nurses' attitude scale. This indicates a high degree of reliability for the study tools.

Ethical consideration:

The study was approved by the ethics committee at the faculty of nursing, Benha University. The researcher clarified aim of the study to studied nurse included in the study. A written approval was prerequisite to recruit nurses in the study. Nurses were assured that all gathered data was used for research purposes only and the study was harmless. Additionally, all of the nurses had the freedom to withdraw from the study at any time without given any reason. Confidentially of the gathered data and results were secured.

Pilot study:

A Pilot study was conducted to test the clearness and applicability of the study tools and to estimate the time needed for each tool, it was done on 10% of the total subjects, (6) nurses' (6) children who had hypoxic ischemic encephalopathy and excluded from the present study to avoid sample bias and contamination. In the light of pilot study analysis and modifications were done and the last form was developed, this phase took one month from beginning of January 2021 to the end of January.

Field Work:

The education program was implemented to achieve the aim of the current study by these phases; assessment, planning, implementation and evaluation phases. The education program was conveyed from the earliest starting point of February 2021 to October 2021 covering 9 months.

Assessment Phase

Assessment phase involved interviews with the studied nurses to collect baseline data. The researcher visited previously mentioned setting, by rotation four days weekly covered a period of 4 months, (Saturday, Sunday for PICU while Monday and Wednesday for NICU) at 12pm to 1: pm after nurses' endorsement and suitable time for all nurses to collect the data by using pervious mentioned tools. Average of 3-4 nurses was interviewed per week. At the beginning of the interview, the researcher greeted nurses and explained the aim of the study and take their written approval participate in the study prior to data collection. Then, the researcher gave the studied nurses questionnaire filling it to assess their knowledge and attitude. After that, each nurse observed separately during their actual practice of procedure to assess their practices by using observation checklist, as following:

Firstly, the questionnaire sheets were distributed to all nurses individually to collect their characteristic, knowledge and attitude regarding hypoxic ischemic encephalopathy in the presence of the researcher to clarify and answer the question. The average time needed 10-15 minutes.

Secondary, the researcher observed nurses' practices during their shifts by using the observational checklist. The evaluation time needed for completion of each direct observation between 20-25 minutes.

Planning phase

Based on baseline data obtained from assessment phase and relevant review of literature, the educational program was

constructed, revised and modified according to nurses' needs to improve their performance regarding hypoxic ischemic encephalopathy. The contents were prepared according to nurses' level of understanding in simple Arabic language. Different methods of teaching were used as power point presentation, group discussion and modified lecture. Suitable teaching media were included hand out, data show to help proper understanding of the content for nurses.

Implementation phase

- Toward the start of the program session, a direction to the motivation behind program took place and nurses were informed about time and place of sessions which were carried out at neonatal and pediatric intensive unites lecture room.
- The studied nurses were divided into 10 groups, each group consist of 5 nurses, the program has taken 9 hours for each group and were implemented according to nurses readiness, distributed as the following;(3 sessions for theoretical part each session kept going 1 hours, 4 days/ week in the morning shift. It took about (16) weeks for program implementation.
- **Theoretical part for the studied nurses as the following**; **The first session** of the program included introduction to education program, overview about nervous system anatomy and physiology, definition of hypoxic ischemic encephalopathy, causes and clinical manifestation. **The second session** of the program included risk factors, degree and investigation. **The third session** of program included treatment of hypoxic ischemic encephalopathy, complication and its nursing care.
- **Practical part for the studied nurses as the following, the fourth session** included procedure regarding, steps of vital signs measurement. **The fifth session** focus on steps of blood glucose monitoring, body weight measurement, fluid balance chart and skin turgor. **The sixth session** included steps of naso gastric tube feeding. **The seventh session** focus on steps of nasopharyngeal and endotracheal tube suction. **The eighth session** focus on oxygen therapy administration.
- **Evaluation phase:**

After the implementation of the program contents, the post test was carried out by using the same pretest tools to assess nurses' performance regarding care of infant suffering from hypoxic ischemic encephalopathy after program implementation.

Statistical Analysis:

The collected data was organized, analyzed and tabulated using SPSS (statistical package for social science) version 21 for windows, running. On IBM compatible computer. Data were presented in the form of numbers and percentage for qualitative variables, mean and stander deviation for quantitative variables. Test of significant, Chi- squares and fisher exact test. As well as correlation coefficient(r) used for qualitative variable that were normally distributed. A significant level value was considered when P-value <0.05, highly statistical significant was considered when P-value <0.001 and P-value > 0.05 was considered no statistical significant difference.

Results:

Table (1): Reveals that less than half (43.3 %) of nurses are in the age group 20 <30 years with mean age (30.00 ± 9.69) years. Less than two thirds (61.7%) of nurses are female, more than half (56.7%) of them have Technical institute of nursing, less than half (43.3 %) of them have experience less than 5 years and less than three quarters (70.0 %) of them don't attend any training courses regarding hypoxic ischemic encephalopathy.

Table (2): Shows that more than one third (38.3%) of the studied infant their gestational

age range from (37>40) weeks with mean age (38.12±1.62), more than one third (36.7%) of them their current age ranged from (1<6) months with mean age (15.62±3.24). Concerning mode of delivery and gender, more than half (56.7% & 51.7%) of them born through normal delivery and are female respectively. Also, more than half (55.0%) of the studied infant their weight at birth range from (1500<2000) with mean weight (1900.15±0.450). Regarding weight at admission, three quarters (75.0%) of infants their weight range from (3<6) Kg with mean (2.74±2.53), while less than three quarters (71.7%) of them their current weight range from (3<6) Kg with mean (3.850±2.14).

Figure (1): Illustrates that, more than one third (38.3%) of the studied infant stayed in hospital more than two week. Less than one third of the studied infant (33.4%) stayed in hospital from one to two weeks while more than quarter (28.3%) of them stayed in hospital less than one week.

Figure (2): Illustrates that, less than half of the studied nurses (46.7%) have poor level of knowledge pre- program implementation. On the other hand, majority (80.0%) of them have good level of knowledge post program implementation.

Figure (3): Demonstrates that, less than one third (28.3 %) of the studied nurses have incompetent practices level pre-program implementation. While, the majority (93.3%) of them have competent practices level post program implementation.

Figure (4): Shows that, more than one third (36.7 %) of the studied nurses has negative attitude pre-program implementation, while the majority (90.0%) of them has positive attitude post program implementation.

Table (3): Reflects that, there was a statistical positive correlation between total nurses' knowledge and total practices scores pre-program implementation (p= 0.05). Meanwhile, there was a highly statistical significant positive correlation between total nurses' practices, total knowledge and total attitude scores post program implementation (p= 0.000).

Table (1): Distribution of studied nurses regarding their characteristics (no=60).

Demographic characteristics		No	%
Age	<20	9	15.0
	20<30	26	**43.3**
	30<40	14	23.3
	≤40	11	18.3
	Mean ±SD	**30.00±9.69**	
Gender	Male	23	38.3
	Female	37	**61.7**
Educational level	Nursing school	19	31.7
	Technical institute of nursing	34	**56.7**
	Post graduate	7	11.7
Years of Experience	<5	26	**43.3**
	5<10	16	26.7
	≥10	18	30.0
	Mean ±SD	**8.90±9.93**	
Training courses regarding hypoxic ischemic encephalopathy	Yes	14	23.3
	No	46	**70.0**

Table (2): Distribution of studied infants regarding medical record and their characteristics (no=60).

Infant characteristics		No	%
Gestational age	<37 weeks	10	16.7
	37 weeks	19	31.7
	37<40 weeks	23	**38.3**
	≥40 weeks	8	13.3
	Mean ±SD	**38.12±1.62**	
Current age	<one month	17	28.3
	1<6 months	22	**36.7**
	6<12 months	9	15.0
	12<24 months	12	20.0
	Mean ±SD	**15.62±3.24**	
Mode of delivery	Normal	34	**56.7**
	Cesarean	26	43.3
Gender	Male	29	48.3
	Female	31	**51.7**
Weight at birth/gm	<1500	10	16.7
	1500 <2000	33	**55.0**
	2000<3000	11	18.3
	>3000	6	10.0
	Mean ±SD	**1900.15±0.450**	
Wight on admission/ Kg	<3	10	16.7
	3<6	45	**75.0**
	6<9	5	8.3
	Mean ±SD	**2.74±2.53**	
Current weight	<3	11	18.3
	3<6	43	**71.7**
	6<9	6	10.0
	Mean ±SD	**3.850±2.14**	

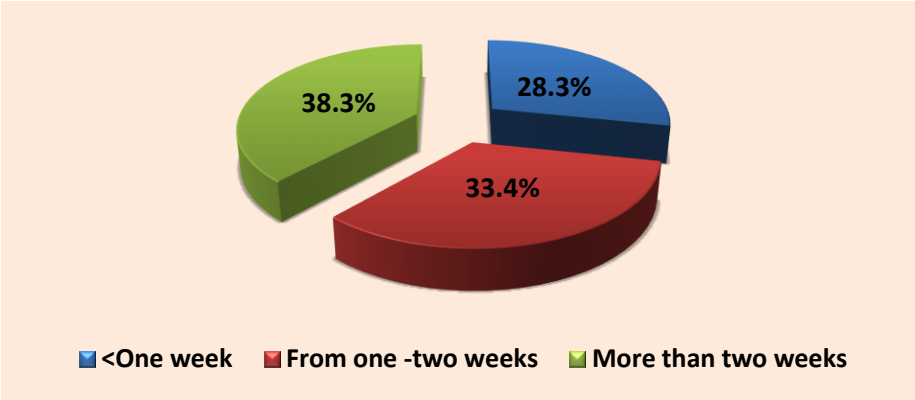

Figure (1): Length of hospitalization among the studied infant (no=60)

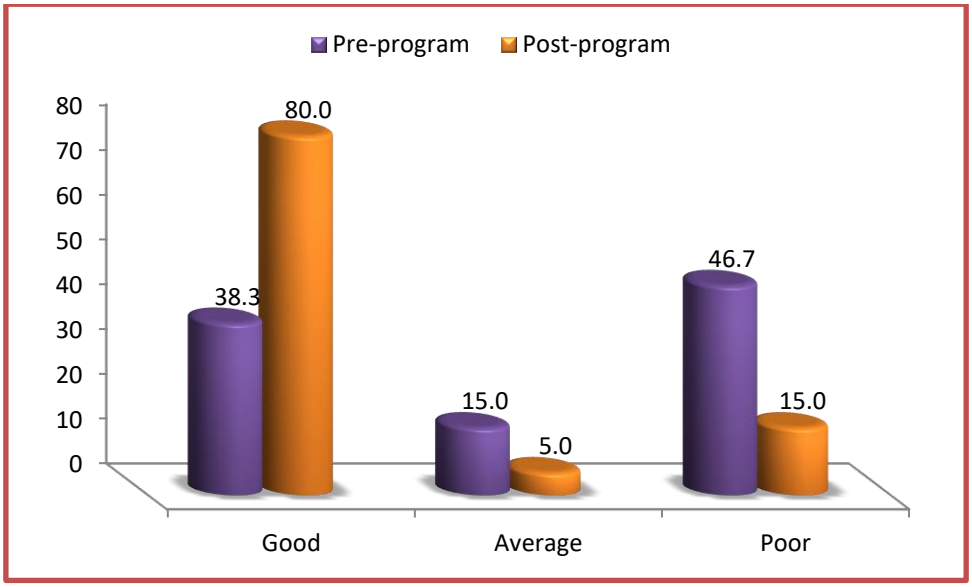

Figure (2): Total nurses' knowledge level at pre and post program implementation (no=60).

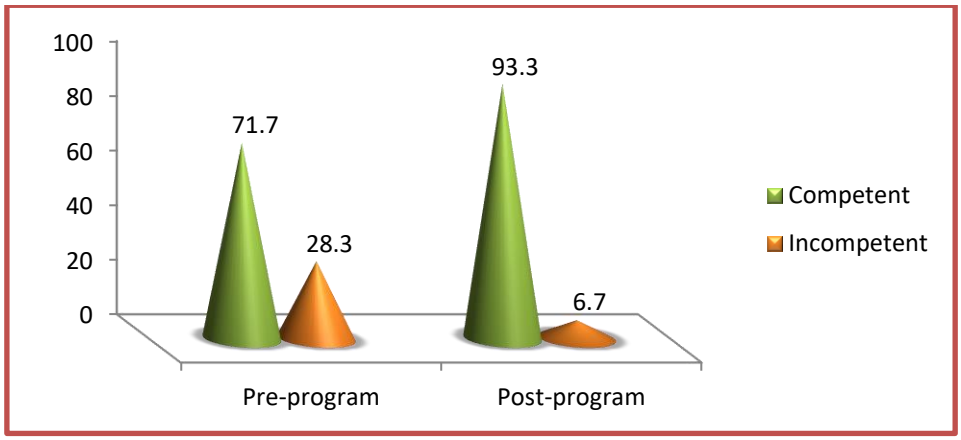

Figure (3): Total nurses 'practices level pre and post program implementation (no=60).

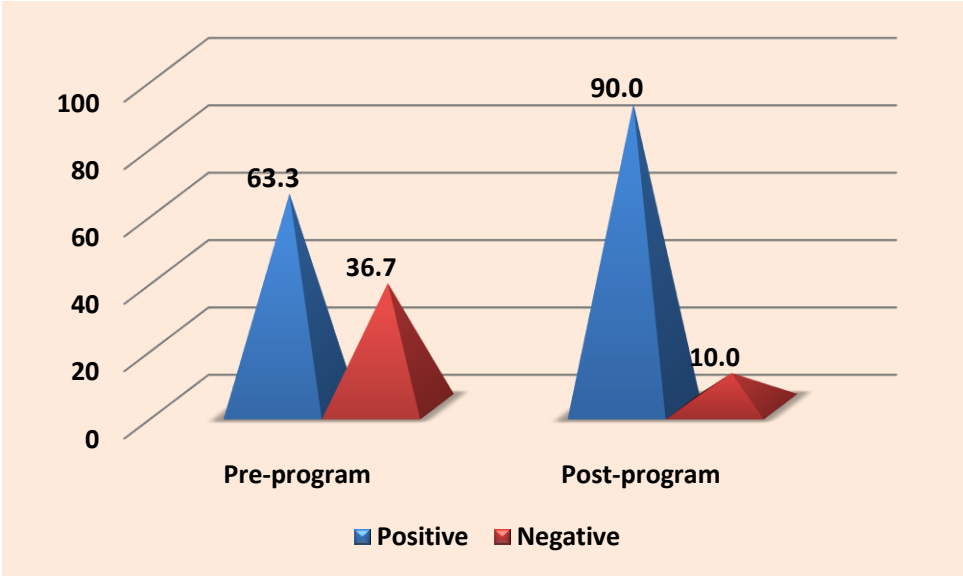

Figure (4): Total nurses' attitude level pre and post program implementation (no=60).

Table (3): Correlation matrix between total knowledge, practices and attitude scores among the studied nurses pre and post program implementation (no=60).

Items		Preprogram			Post program		
		Total knowledge	Total practices	Total attitude	Total knowledge	Total practices	Total attitude
Total knowledge	r	1	.355	.421	1	.788	.565
	p-value		.05*	.106		.000**	.035*
	no	60	60	60	60	60	60
Total practices	r	.355	1	.235	.788	1	.485
	p-value	.05*		.156	.000**		.000**
	no	60	60	60	60	60	60
Total attitude	r	.421	.235	1	.565	.485	1
	p-value	.106	.156		.035*	.000**	
	no	60	60	60	60	60	60

A statistical significance differences (p=≤0.05*) A highly statistical significance differences (p=≤0.001)**

Discussion:

Hypoxic ischemic encephalopathy (HIE) was a serious problem causes death in infants and was associated with neuromuscular disorder. Hypoxic-ischemic encephalopathy (HIE) was one of the most severe birth complications that causes neonatal brain damage due to asphyxia at the placental and pulmonary levels in the fetus and newborn. The incidence of HIE is approximately 3-5 per 1000 live births. Sever or moderate Hypoxic ischemic encephalopathy leads to death, cerebral palsy, or severe neurodevelopmental impairment which was a composite outcome that included cognitive, epilepsy, behavioral, educational, and motor impairments **(Halil et al., 2021).**

Infants with hypoxic ischemic encephalopathy require specialized medical and nursing care to survive. Pediatric nurses play a key role in the planning and delivery of care to infant and their families. Pediatric' nurses must possess highly developed critical thinking and care provision skills to help these infants to develop appropriately. A lack of educational programs for pediatric nurses was identified and an educational framework aimed at expanding the role of neonatal nurses to improve quality of health services for infants **(Messner, 2021).** So, the current study aimed to evaluate the effect of educational program on improving nurse' knowledge, practices and attitudes towards hypoxic ischemic encephalopathy.

Concerning the studied nurses' characteristics, the present study showed that nearly half of the studied nurses their age more than 20<30 years with mean 30.00±9.69 years. This result could be due to hospital administration prefer this age and the newly nurses seek to achieve career pathway and develop themselves to gain experience. These were supported by **Thabet, et al., (2020)** who studied that "Effect of Implementing Teaching Program on nurses' Performance Regarding Hypoxia for Critically Ill Patients" and showed that majority of the nurses and their ages ranged from 18-27 years.

Concerning characteristics of the studied infant, the present study showed that more than half of the studied infant their gestational age ranges from (37>40) weeks with mean 38.12±1.62. These results were compatible with **Mohammed et al (2021)** who conducted a study about **"**Impact of outreach education program on outcomes of neonates with hypoxic ischemic encephalopathy" and reported that the gestational age of neonates at birth was (38- 40) weeks.

The current study revealed that, more than one third of them stayed at hospital for more than two weeks after their labor. This was consistent with **Vanessa et al. (2017)** who made study about "Intrapartum factors associated with infant hypoxic ischemic encephalopathy: a case-controlled study" and reported that nearly one third of studied infant had prolonged second stage of labor which increased risk factors for the development of HIE and this led to their staying in the hospitals.

On investigating nurses' knowledge level about hypoxic ischemic encephalopathy the current study result showed that, less than half of studied nurse had poor level of knowledge pre program implementation. This could be due to the lack of nurses' incentives and desire to enhance or at least refresh their knowledge whether new or old graduated nurses as well as the work overload. This result supported with **Mohammed et al., (2019)**. Who conducted study about "effect of educational program on pediatric nurses' knowledge and practice regarding selected no pharmacological Techniques to Relive Pain in hypoxic ischemic Neonates" and stated that, two third of the studied nurses had poor level of knowledges pre-program implementation .

After implementation the program, the present study showed that the majority had good level of knowledge. From the researcher point of view this improvement related to the program was a successfully method to increase nurses' knowledge. This result similarly with **Abuo Zed, (2019)** who carried out a study about Impact of nursing guidelines on nurses' knowledge and performance regarding to prevention of ventilator associated hypoxic ischemic in neonates and revealed that more than two third of the studied nurses had good level of knowledges post program implementation .

The result of the current study revealed that, less than one third of the studied nurses had incompetent practices level pre-program implementation. This could be due to lack of continuous training and education performed for nurses 'regarding care of infant with hypoxic ischemic encephalopathy. This result was compatible with **Lee,J.,& Lee,Y., (2019)** who studied "Effects of an Algorithm-based Education Program on Nursing Care for Children with Epilepsy by Hospital Nurses" and found that more than one third of the studied nurses had incompetent practices level preprogram.

After implementation the program, the current study illustrated that the majority of the studied nurse had competent practices level post program implementation. This finding was supported with **Mohamed, et al., (2021)** who studied " Influence of Training Program Implementation on Nurses 'Performance Regarding Neonates Invasive Mechanical Ventilation "and found that more than three quarter of nurses had competent practices post program implementation.

Regarding nurse's attitudes about HIE, the present study showed that, more than one third of studied nurses had negative attitudes regarding hypoxic ischemic encephalopathy preprogram implementation, this could be due to decrease awareness' nurses about nursing care, medical treatment and delayed growth leading to a small stature and immature appearance. Moreover, after program implementation the majority of studied nurses

had positive attitude regarding HIE. This could be due to increase nurses' awareness after program implementation. This result was agreed with **Lee,J.,& Lee,Y., (2019)** who found that, more than two thirds of the studied nurses had positive attitudes after implementation of the program.

The current study findings revealed that, there was a statistical significant positive correlation between total nurses' knowledge and total practices scores pre-program implementation. While, there was a highly statistical significant positive correlation between total nurses' practice, total knowledge and total attitude scores post-program implementation. This could be due to the knowledge and practice of nurses was improved after implementation the program and this reflects positively on nurses' attitude.

These results were consistent with **Zhang &Wang (2022)** who conduct a study " application effect analysis of clinical nursing pathway in the care of neonatal Hypoxic-Ischemic encephalopathy" and found that there was a highly statistical significant positive correlation between nurses' total practice, total knowledge and total attitude scores in both pre and post program implementation (p=0.001).

Conclusion:

The educational program had a significant positive effect in improving nurses' performance regarding care of infant suffering from hypoxic ischemic encephalopathy. Besides, there was a statistical positive correlation between total nurses' knowledge and total practices scores pre-program implementation. Meanwhile, there was a highly statistical significant positive correlation between total nurses' practices, total knowledge and total attitude scores post program implementation (p= 0.000).

Recommendations:

- Continuous updating for nurses' knowledge as it reflects on their perception and helps them to be having positive attitude and beliefs toward infant suffering from hypoxic ischemic encephalopathy.
- Continuous educational programs for nurses to increase their awareness about care of infant with hypoxic ischemic encephalopathy to ensure enough knowledge and decrease functional disabilities of the infant with hypoxic ischemic encephalopathy.
- Replication of the study on a larger probability sample in other different settings is highly recommended to achieve generalizable results.

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آداء الممرضين تجاه رعايه الاطفال الرضع الذين يعانون من الاعتلال الدماغي :برنامج تعليمي

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يعتبر الاعتلال الدماغي الامراض الخطير التي تؤثر علي حوالي 5و1% الي 5و2% تقريبا من الاطفال حدبثي الولاده لكل الف طفل مولود ومن مضاعفات هذا المرض الصرع والتخلف العقلي والشلل الدماغي لذايحتاج الممرضين الي تحديث معلوماتهم عن المرض والمشاركه في كيفيه رعايتهم . لذا هدفت هذه الدراسة الي تقييم تأثير برنامج تعليمي لتحسين معلومات واداء الممرضين تجاه الاعتلال الدماغي . وقد أجريت هذه الدراسة في في وحدة المبتسرين ووحدات العناية المركزة للأطفال في مستشفى الأطفال التخصصي في مدينة بنها. وقد اشتملت العينة على جميع الممرضين الذين يعملون في الأماكن المذكوره وعددهم(60) سابقًا لمدة ستة أشهر و عينة هادفة من الأطفال الرضع(60) الذين يعانون من الاعتلال الدماغي . وأظهرت النتائج أن اقل من نصف (46.7٪) من الممرضين الخاضعين للدراسة لديهم مستوى ضعيف من المعرفة فيما يتعلق للرعايه التمريضيه للاعتلال الدماغي للرضع قبل تنفيذ البرنامج التعليمي. ولكن بعد تنفيذ البرنامج التعليمي ، كان لدى الغالبية منهم (80٪) درجة إجمالية جيدة من المعرفة حول الرعايه التمرضيه للاطفال الرضع الذين يعانون من الاعتلال الدماغي. وكشفت الدراسة الحالية عن وجود علاقة ذات دلالة إحصائية بين مجموع درجات المعرفة وومارسات الممريضين قبل البرنامج وفي الوقت نفسه ، كان هناك ارتباط ذو دلالة إحصائية عاليه بين مجموع درجات المعرفة وممارسات الممريضين بعد تنفيذ البرنامج. وقد اوصت نتائج الدراسة بعمل برنامج تدريبي منتظم وورش عمل للممرضين لزياده وعي الممرضين للاطفال الاعتلال الدماغي .