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Abstract:

Background: Congenital heart disease is the most common major birth defect in infants. Aim of study: Was to evaluate the effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases. Design: A quasi- experimental design was used in the current study. Setting: The present study was conducted in the Pediatric Cardiac Care Unit and Surgical Intensive Care Unit at Specialized Pediatric Hospital at Benha City. Subjects: A convenient sample of (51) nurses who working at the previously mentioned setting included in the study and a purposive sample of (102) infants who had congenital heart disease post operatively. Tools of data collection: Tool (1): A structured interviewing questionnaire sheet consists of part (1): personal characteristics of the studied nurses, part (2): Nurse's knowledge regarding congenital heart disease, and part (3): Nurse's knowledge regarding post-operative feeding for infants with congenital heart disease. Tool (II): An observational checklist to assess nurses' practices. Tool (III) Infant Nutritional Outcomes: consists of Part (1): Personal characteristics of the studied infants, Part (2): Infant health assessment sheet and Part (3): nutritional outcomes. Results: Most of the studied nurses had good knowledge level and had competent practice in post protocol of feeding implementation. One third of infants stayed in hospital for a period 1->7 days pre-program implementation compared to less than three quarters post protocol of feeding implementation. There was high statistically significant difference in the total mean of weight gain of infants pre and post protocol of feeding implementation. Conclusion: Protocol of feeding was effective in improving nurses' performance regarding effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases. There was high statistically significant difference in the total mean of weight gain of infants pre and post protocol of feeding implementation. Recommendation: Conducting regular training program and workshops for nurses regarding improving nutritional outcomes of infant post-operative with congenital heart disease.

Keywords: Congenital heart disease, Feeding Protocol, Infants, Nurses, Nutritional Outcomes.

Introduction

Congenital heart defect (CHD) can be defined as an anatomic malformation of the heart or great vessels which occurs during intrauterine development, irrespective of the age at presentation (**Herridge et al.,2021**). CHD is major congenital anomalies, which consists of heart defects present from the birth. CHD among all birth defects is the main cause of death in infancy, which are the most common type of congenital malformations, occur in 1 % of newborn infants and are associated with a high perinatal morbidity and mortality (**Al-Jeboori et al.,2019**).

Congenital heart disease is the most common congenital anomalies (CA), with a prevalence of 4 to 50 per 1,000 live-births in different studies, depending on the examination age and the sensitivity of the examination technique (Giraldo-grueso et al ,2020). However, (Huisenga, et al .,2021) stated that CHD is the most common birth defect worldwide, affecting millions of newborns every year. The mean prevalence of CHD between 1970 and 2017 globally was 8.22 per 1000. During this period, the overall prevalence of CHD globally increased by 10% every 5 years.

Congenital heart disease is categorized into trivial, moderate and severe lesions or a cyanotic versus cyanotic defects according to the pathophysiology and affected heart structure. A cyanotic lesions are mostly included in the milder CHD group and this includes septal cardiac defects like Atrial Septal Defect (ASD), Ventricular Septal Defect (VSD), and atrioventricular canal defects. In addition, left ventricular outflow obstructive lesions like aortic stenosis and coarctation of aorta are other examples of a with more complexity. cyanotic CHD Cyanotic CHD include Tetralogy of Fallott transposition of great arteries, total anomalous pulmonary venous returns, hypoplastic left heart syndrome, truncus arteriosus, and tricuspid atresia (Khasawneh, et al , 2020).

Infants with congenital heart disease are likely to experience a wide range of complications throughout their lives, including but not limited to, malnutrition. An alteration in normal hemodynamics contributes to impaired intestinal absorption and increased metabolic demands, which consequently affects nutritional intake. Infants are especially high-risk and struggle with delayed enteral feeding, which can lead to failure to thrive and numerous other physical and neurodevelopmental impairments. (Martini,et al ,2021).

Sometimes, it is not possible for an infant to meet all nutritional needs by mouth and it is recommending the placement of a feeding tube. Feeding tubes can be temporary (through the nasal passage) or more permanent (directly into the stomach through the abdominal wall). Feeding tubes can be a wonderful way to meet the nutritional needs. Introduction of a multiinterventional nutrition program was associated with improved weight gain. Improved nutrition may be fundamental to stimulating growth, wound healing, myocardial and vascular function, reducing the length of hospital stay, the risk of nosocomial infections, and improving neurodevelopmental outcomes (Huisenga, et al 2021).

Human milk is preferred for all infants including those with CHD. it is generally believed that human milk is better tolerated, promotes intake and growth, and may be with fewer postoperative associated complications. If breast feeding is not possible, delivery of human milk by bottle or feeding tube is considered the best alternative. In an effort to promote human milk ingestion, milk banks have also been established in many jurisdictions that facilitate the provision of donor breast milk in the event that maternal milk is not possible or insufficient. Standard infant formulas are also available and are generally well tolerated. Partially or extensively hydrolyzed formulas may be needed in the setting of feeding intolerance that is commonly experienced by infants with more complex CHD (Herridge et al.,2021).

Feeding infants with CHD post-operative should be initiated as soon as possible, with breast milk or formulas that ensure the energy and macronutrients requirements are met. A term ill newborn initially needs 40–60 kcal/kg/day, with a gradual increase to90–120 kcal/kg/day. The daily requirement of

carbohydrates is between 9–14 g/kg/day (40– 50% of total calories), proteins 1.8–2.2 g/kg/day (7–16% of total calories), and lipids of 4–6 g/kg/day (34–35% of total calories). In neonates with a CHD, the daily caloric intake should be up to 50% higher, but without exceeding 150 mL/kg/day liquid volume, and daily protein requirements can be as high as 3 g/kg/day (**Luca,2022**).

The Principle of nursing care should focus on essential health information and instruct the caregivers to take care of their CHD children effectively. The most important nursing role is proving safety nursing care with a good quality of life. In addition to focusing on assessment of homeostasis and pulmonary blood flow during the immediate postoperative period. Attention to nutritional status is important for the long-term recovery. Postoperative care requires close monitoring of vital signs, chest tube output, platelet counts, liver function tests, guaiac tests, and pulmonary and circulatory status (**Ayşe& Gülten 2022**).

Significance of the study:

Congenital heart disease is the main reason of death in the first year of life of infants. According to statistical analysis in egypt of the incidence of CHD in 2018 was approximately 9 per 1000 live births and about 2 to 3 in 1000 infants will be symptomatic during the first life of year. On the other hand, the nurse is considered a primary care giver to the infants so her knowledge and practice should be improved that reflected on nutritional outcomes during hospitalization for infants with CHD. Adequate nutrition postoperative for infants with CHD is essential for growth, wound healing, immune function and decrease length of stay in the hospital. A feeding protocol may promote earlier enteral feeding and shorter time to reach full calories and decrease the use of total parental nutrition

and central lines (Center for Statistics and Mobilization,2018 and Tume et al., 2018). Aim of the study:

The aim of the current study was to evaluate the effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases.

Research hypotheses:

-Nurses' knowledge and practice regarding post-operative feeding for infants with congenital heart diseases expected to be improved after implementation of the protocol. -Nutritional outcomes for post-operative CHD infants expected to be improved after implementation of the protocol.

Subjects and Method

Research design:

Quasi- experimental research design was utilized to achieve the study's aim.

Study setting:

The current study was conducted at Pediatric Cardiac Care Unit (PCCU) and Surgical Intensive Care Unit (SICU) at Specialized Pediatric Hospital in Benha City, which Affiliated to Egyptian Ministry of Health and Population.

Research Subject:

- 1- Convenient sample of (51) nurses who working at the above-mentioned setting regardless their characteristics and willing to participate in the study.
- 2- A purposive sample of infants (102 infant), they were divided into two groups, (51 infant) who were recruited in the study pre feeding protocol implementation, and other (51 infant), who were recruited in the study post-feedingg protocol implementation.

Tools of Data Collection

Data of the current study was collected by using the following three tools:

Tool (1): A Structured Interviewing Questionnaire Sheet:



This tool was developed by the researcher under supervision in the light of current relevant studies and research. It was written in English language and translated into Arabic language; it was composed of three parts:

Part (1): Personal characteristics of the studied nurses which included; age, sex, marital status, educational level, years of experience in PCCU and SICU, previous training courses regarding post-operative protocol of feeding on improving nutritional outcomes for infants with congenital heart disease and number of training courses. It was composed of 8 open-ended questions.

Part (2): The nurses' knowledge regarding congenital heart disease. It was adopted from **Bah et al., (2018)**. It was consisted of 3 categories; (10) MCQs covering nurses' knowledge regarding congenital heart disease for infants. In addition, (11) MCQs covering nurses' knowledge regarding open heart surgery. Meanwhile (17) MCQ covering nurses' knowledge regarding the effect of post-operative protocol of feeding on improving nutritional outcomes for infants with CHD.

Scoring system of knowledge:

Each item was scored as (2) in case of correct and complete answer, (1) in case of correct and incomplete answer, and (0) in case of wrong answer or don't know. According to statistical analysis, the total knowledge score was ranged from 38-76 degrees.

The total knowledge levels would be categorized as;

- ✤ Good total knowledge ≥85% (64 degrees)
- ✤ Average total knowledge 60< 85% (64-44 degree).
- ♦ Poor total knowledge $\leq 60\%$ (≥44 degrees).

Tool (2): Observational Checklist: This tool was adopted from Bowden and Greenberg

(2012). to assess nurses' practice regarding post-operative nursing care for infants with congenital heart disease. It was consisted of 68 steps to assess the nursing procedures for infants with congenital heart disease after surgical management. It was consisted of 3 categories; intravenous fluids infusion (14 steps), NGT feeding (22 steps), breastfeeding (9 steps), bottle feeding (11 steps), and feeding tolerance (12 steps).

Scoring system of nurses' practice:

Each item was scored as (1) when done, and (0) if not done. These scores were summed –up and converted into a percent score. Total score classified as the following:

- Competent practice when the score was equal to or more than 85.0% to 100.0%(58-68 degree)
- Incompetent practice when the score was less than 85.0% (≥ 57 degree).

Tool (3): Infant Outcome Assessment Sheet: It was developed by the researcher under supervision from the study supervisors in the light of current relevant studies and research. It was consisted of 2 parts and 30 items.

Part (1): It dealt with the personal characteristics of the studied infants. It was contained 9 items, such as; personal data (age, gender, and type of delivery), medical data (diagnosis, time of discovering the disease, signs and symptoms, previous hospitalization, medications, and mechanical ventilator.

Part (2): It was consisted of 21 items to assess the infants' health outcomes. It was contained items to assess length of hospital stay (1 items), vital signs (4 items), wound assessment (5 items), anthropometric measurements (5 items), and feeding tolerance (6 items).

Content Validity:

Tools of data collection were investigated for their content validity by three

experts in the field of pediatric nursing from Faculty of Nursing, Benha University and Mansoura University to test the content validity of the instruments and to judge its clarity, comprehensiveness, relevance, simplicity, and accuracy. All of their remarks were taken into consideration; some items were re-phrased to arrive at the final version of the tools. The tools were regarded as valid from the experts' point of view.

Reliability:

Reliability of tools was done to test the internal consistency of the tools. It was estimated using Cronbach's Alpha test. Cronbach's Alpha test was equal (0.76 & 0.84) for nurses' knowledge questionnaire sheet, observational checklist and infant outcome assessment sheet respectively.

Ethical considerations:

Written approval was obtained from the ethical committee of Faculty of Nursing Benha University. The researcher clarified aim of the study to the studied nurses. Verbal approval was prerequisite to participate in the study. The studied nurses and the parents of the studied infants were assured that all gathered data were used in research purpose only and the study was harmless. Additionally, the studied nurses and the studied infants were allowed to withdraw from the study at any time without giving the reason. Confidentiality and anonymity of the gathered data and results were secured.

Pilot Study:

A pilot study was carried out to test the applicability, clarity, and efficiency of the tool and to estimate the time needed for each tool. It was done on 10.0% of the total study subjects (5 nurses) and (6 infants) undergoing post-operative with congenital heart diseases who were excluded in the present study to avoid sample bias and contamination. In the light of pilot study analysis, modification was done and the last form was developed. This period of pilot study took 1 week.

Filed 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 January 2021 to September 2021 covering 9 months.

Assessment phase:

This phase involved interviewed with nurses to collect baseline data. The researcher was available two days/week; (Saturday and Monday) from 10.00 AM and extended to 1 PM. Average number collected was 4-5 nurses per /day. At the beginning of interview; the researcher welcomed each nurse, explained the purpose, duration and activities of the study and took oral approval from nurses. The data of infants undergoing open heart surgery were collected by researcher from the medical record.

Then, the researcher gave the studied nurses tool (I) for filling it to assess their knowledge regarding congenital heart disease, open heart surgery and feeding protocol, it took nearly 30-45 minutes. After that, the data of the infants undergoing open heart surgery was collected from medical record and it took nearly 15 minutes for each infant tool (3). Each nurse was observed separately during their actual practice of procedures to assess their practice by using observational checklist tool (2). nursing 60 minutes. The average time needed for the completion of each observation (by the researcher) was between 30-45minutes This period of pretest took 4 weeks (from the beginning of December 2020 to the beginning of January 2021).



Planning phase

Based on baseline data obtained from pre-test assessment and relevant review of literature, the educational program were developed by the researcher as indicated by nurses' level of comprehension in simple Arabic language. Different methods of teaching were used such as modified lecture. brain storming, demonstration, re-demonstration and group discussion. Suitable teaching media were included hand out as well as audio-visual aids, role play and real equipment to help proper understanding of the content by nurses.

Protocol of feeding: It took two months from the beginning of January2021 to the beginning of March 2021.

Statements of objectives:-

General objective:

The feeding protocol aimed to evaluate the effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases.

Implementation phase:

This phase took six months from the beginning of March 2021 to the end of Auguest 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 studied nurses. Motivation and reinforcement during sessions were used to enhance motivation for the sharing in the study. The nurses were informed about the time and place of sessions which were carried out at lecture room in the pediatric department. program was implemented through 9 sessions. The studied nurses(51 nurses) were divided into 8 groups each group consisted of 6-7 nurses, the program has taken 4-8 hours for each group, distributed as the following; (6) session for theoretical part each session kept going an hour and (3) session for practical part, each session kept going an hour, 2 days/week in the morning and afternoon shifts and were implemented according to nurses readiness. Each session included 10 minutes for discussion and feedback. Each session usually be started by a summary of what has been taught during the previous session and the objectives of the new topics. These sessions were repeated to each group of nurses.

Theoretical part as the following;

The first session of the program included the normal mechanism of the heart, Definition of congenital heart defects in children, the causes of congenital heart disease and the types of congenital heart defects.

The second session included congenital defects of the heart that cause the infant's cyanosis. The signs and symptoms that appear on an infant with congenital heart defects that cause cyanosis. Types of treatment for infants with congenital heart defects that cause cyanosis.

The third session included congenital defects of the heart that cause cyanosis in the infant, the signs and symptoms that appear on an infant with congenital heart defects that do not cause cyanosis and the types of treatment for infants with congenital heart defects that do not cause cyanosis.

The fourth session included the complications of congenital heart defects and ways to prevent congenital heart defects in children.

The Fifth session included Definition of open heart surgery for infants with congenital heart defects and complications that result from open heart surgery in infants immediately after surgery and in the long term.

The six session included the nursing care provided to the infant before the open heart surgery, the nursing care provided to the infant during and after open heart surgery. and explanation of the feeding protocol for infants

with congenital heart defects after open heart operation (when start feeding, why start by simple amount, Factors on which the infant's nutrition depends, contraindications of feeding, volume of feeding and signs of feeding tolerance and intolerance.

Practical part as the following; the first session included procedures of Intravenous fluid infusion check list.

The second session included feeding check list (nasogastric feeding, breast feeding and bottle feeding)

The third session post-operative feeding protocol for infants with congenital heart disease to evaluate feeding tolerance.

Evaluation phase:

This phase took one month from the beginning of September 2021 to the end of September 2021.

After the implementation of the educational program content, the post-test was administered to assess nurses' knowledge and practices using the same formats of pretest. This help to evaluate the effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases. This was done immediately after the implementation of educational program.

Statistical analysis:

Raw data were coded and transformed into coding sheets, extracted from the interview questionnaire, and computerized in Microsoft Excel 2019. Statistical analysis was done by IBM SPSS version 22.0. Qualitative data were represented using numbers and percentages.Quantitative data were described as mean, and standard deviation. Qualitative variables were compared using the qui square test (X^2) as the test of significance and the pvalue is the degree of significance and using the Pearson correlation test (r).An independence t-test was utilized to determine

the statistically significant difference between the means within two different groups.Fisher's test is an independence test used to examine the significance of the association between the two kinds of classification and it knows whether the proportions for one variable are different among the values of the other variable.A significant level value was considered when the p-value ≤ 0.05 , while a highly significant level value was considered when the p-value ≤ 0.001 , and p-value > 0.05indicates non-significant results.

Results:

Table (1): Showed that, one third (33.3%) of them were in the age group (25-<30) years with mean age 28.63±6.42 year. More than half (56.8%,60.8%) of them had bachelor degree and had experience less than five years respectively. Regarding previous training course related caring of infant undergoing congenital heart surgery, the majority (88.2%) of the studied nurses didn't attend any training courses aboutnutritional outcomes for infant undergoing congenital heart surgery.

Table (2): Illustrated that, more than one third (45.1% & 51%) of infants pre and post feeding ptotocol implementation were in the age group (1) months respectively. Regarding gender, 64.7% & 70.6% of infants pre and post feeding ptotocol implementation were females respectively. The same table revealed that, 78.4% & 86.3% of infants pre and post feeding ptotocol implementation were delivered by CS respectively. without statistically significant differences pre and post feeding ptotocol implementation (p>0.05).

Figure (1): Clarified that, more than one third (36.3%) of the studied nurses had poor level of knowledge regarding effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases pre feeding ptotocol implementation. Meanwhile, the majority of

them (88.2%) had good total score of knowledge about effect of post-operative protocol of feeding for nurses on improving nutritional outcomes for infants with congenital heart diseases post feeding ptotocol implementation

Figure (2): Clarified that more than one quarter (29.4%) of nurses had incompetent level of practice with infants who has congenital heart disease pre feeding ptotocol implementation. Meanwhile, majority (88.2%) of them had competent level of practice toward infants who has congenital heart disease post feeding ptotocol implementation.

Figure (3): Noticed that, less than half (47.1%) of infants pre feeding ptotocol implementation are stayed in hospital for a period 7<14 days

compared to less than three quarters (72.5%) of infants post feeding ptotocol implementation are stayed in hospital for a period 1->7 days.

Table (3): Revealed, there was no statistically significant correlation between total score of practice and length of hospital stay, weight gain and wound assessment at pre and post feeding ptotocol implementation phases. Meanwhile, there was statistically significant correlation between total score of knowledge and length of hospital stay, weight gain, wound assessment post feeding ptotocol implementation at p<0.05. **Table (4)**: Illustrated, there was a positive correlation between nurse's total practice and infants' outcomes (length of hospital stay & wound assessment) at pre / post feeding ptotocol implementation.

Table (1): Percentage distribution of the studied nurses according to their personal characteristics (n=51)

Personal characteristics	No.	%					
Age (years)							
20<25	14	27.5					
25<30	17	33.3					
30<35	11	21.6					
≥35	9	17.6					
Mean±SD	28.63±6.	42years					
Educational level							
Nursing technical school	5	9.8					
Nursing technical institute	15	29.4					
Bachelor of nursing sciences	29	56.8					
Post graduate studied	2	3.9					
Experience years in pediatric cardiac care unit							
1-<5	31	60.8					
5 - <10	11	21.6					
10 - <15	6	11.8					
≥15	3	5.9					
Mean±SD	5.98±5.19years						
Previous training course related caring of infant undergoing congenital heart surgery.							
Yes	6	11.8					
No	45	88.2					
Last time of training course related caring of infant undergoing congenital heart surgery (n= 6).							
1<5 years	3	50.0					
5≥10 years	3	50.0					
Number of training courses (n= 6)							
Once	6	100.0					



Table (2): Percentage	distribution	of	the	studied	infants	according	to	their	personal
characteristics at pre/ post protocol of feeding implementation (n= 102)									

Variables	Pre-program implementation (n= 51)		Post program implementation (n= 51)		X ²	P-value
	No.	%	No.	%		
Age (months)						
1	23	45.1	26	51.0		
6	18	35.3	19	37.3	1.211	0.546
12	10	19.6	6	11.8		
Mean±SD	5.96±2.50		6.29±3.06		t-test-0.603	0.548
Gender						
Male	18	35.3	15	29.4	0.403	0.525
Female	33	64.7	36	70.6		
Mode of delivery						
Normal	11	21.6	7	13.7	1.079	0.299
Caesarean section	40	78.4	44	86.3		



Figure (1): Percentage distribution of the studied nurses according to their total score of knowledge about effect of post-operative protocol of feeding on improving nutritional outcomes for infants with congenital heart diseases at pre/ post protocol of feeding implementation (n= 51)









Figure (3): length of hospital stay among studied infant with congenital heart disease postoperative at pre and post protocol of feeding implementation

 Table (3): Correlation between total score of knowledge of studied nurses and total score of practice at pre/ post protocol of feeding implementation

Variables	Level of knowledge				
	Pre-program		Post-program		
	Implementation		Implementation		
	r	P-value	r	P-value	
Level of practice pre-	0.216	0.128	_	_	
program implementation					
Level of practice post	_	-	0.186	0.012*	
program implementation					



 Table (4): Correlation between level of nurse's practice and infants' outcomes pre /post protocol of feeding implementation

Variables	Level of practice						
	Pre- program p		post	program			
	implementation		implementation				
	r	P-value	r	P-value			
Length of hospital stay	0.197	0.166	0.270	0.049*			
Weight gain	0.242	0.088	0.265	0.030			
Wound assessment	0.109	0.445	0.027	0.015*			

Discussion:

Congenital heart disease (CHD) among infants is a severe and life-threatening disease that requires surgical or catheter intervention within the first year of life, considered the most frequent birth defects as the incidence of CHD approximately 78 per 1000 live births in the world. Malnutrition and failure to thrive have long been recognized as common systemic consequences of CHD so infants with congenital heart disease may need invasive medical intervention or that can produce death within the first 30 days after delivery (**Cubells et al., 2018 and Wong et al., 2015**).

According to general characteristics of the studied nurses, the current study revealed that about one third of nurses are in the age group (25-<30) years. Regarding gender of the studied nurses, more than three quarter of nurses were females. This might be due to nursing profession considering feminine.

The current study was in the same line with the study done by **Majani et al.**, (2022) entitled "New born Screening for Critical Congenital Heart Disease in a Low-Resource Setting; Research Protocol and Preliminary Results of the Tanzania Pulse Oximetry" and noted that, less than one third of participant aged 25 to 30 years old also around three quarters were females.

The current study was supported with the study by **Khaleghi et al.**, (2022), entitled "The effect of the comfort care model on distress, pain, and hemodynamic parameters in infants after congenital h eart defect surgery, Tahran" and noted that less than tee fifths of nurses had bachelor degree and have experience less than five years.

Regarding previous training course related infant undergoing congenital heart surgery; the majority of them don't attend any training courses about infant undergoing congenital heart surgery. This might be lack of training programme to nurses at workplace. This finding in dis agreed with the study done by Miao et al., (2022), entitled "Associations of congenital heart disease with deprivation index by rural-urban maternal residence: a population-based retrospective cohort study in Ontario, Canada" and noted that more than two thirds of nurses participants in study attend many training courses regarding infant undergoing congenital heart surgery. This might be increase awareness regarding important of training nursing staff regarding infant undergoing congenital heart surgery.

Concerning on studied infants general characteristics, the current study illustrated that, the general characteristics of the studied infants. It is noticed that, more than one third of infants pre and post feeding ptotocol implementation were in the age group (6 - < 12)months respectively. This might be due to because of most doctors prefer to do the operation at a young age because of the high rates of survival at this age. The present study was supported with study done by Luca et al., (2022), entitled "Optimal Nutrition Parameters for Neonates and Infants with Congenital Heart Disease, Brazil" and found that more than one third of infants their aged between 6 months< 12 months old. While the present study was in contrast with the study done by Jones et al., (2021), entitled "Disruptions in the development of feeding for infants with congenital heart disease" and noted that, two fifths of participants age from 6 months to 2years. Regarding studied infants gender, the present studies founded that, less than two thirds and less than three quarters of infants before and after program implementation are females.

According to studied nurses total score of knowledge about congenital heart diseases Clarifies that, more than one third of the studied nurses had poor level of knowledge about congenital heart disease among infants pre protocol of feeding implementation. Meanwhile, the majority of them have good total score of knowledge about congenital heart disease among infants post educational protocol of feeding implementation, with a high statistically significant difference (p= 0.000). This might be due to effective of feeding ptotocol.

The present study was in consistent with study done by **Samanidis et al., (2022),** who study entitled "Postoperative nurses knowledge in Neonates and Infants after Congenital Heart Disease Surgery—Current Aspects in Diagnosis and Treatment, Greece" and noted that, less than one third of the participants had poor level of knowledge about congenital heart disease among infants pre educational program implementation. Meanwhile, the majority of them (90.2%) have good total score of knowledge about congenital heart disease among infants post feeding ptotocol implementation.

According to studied nurses total score of practice categories among infants with congenital heart diseases, the present study, mentioned that, there is a high statistically significant difference in the nurses' practice scores regarding IV fluids, breastfeeding, and feeding tolerance at p-value (0.000). In researcher point of view this might be due to increase level of knowledge had positive effect on nurses' practise.

The current study was agreed with the study done by **Gaskin et al.**, (2022), entitled "An improved congenital heart assessment tool: a quality improvement outcome. Cardiology in the Young, Japan" and noted, that, there is a high statistically significant difference in the nurses' practice scores regarding IV fluids, breastfeeding, and feeding tolerance pre and post program education.

Also present study clarified that, more than two thirds of nurses have competent levels of practice with infants who have congenital heart disease before feeding ptotocol implementation. Meanwhile, all of them have competent level of practice with infants who has congenital heart disease after educational feeding ptotocol implementation, with a high statistically significant difference (p= 0.000).

The current study was in the same opinion with the study done by **Peterson & Casida**, (**2021**), entitled "Critical Care Clinical Nurse Specialist Role in Developmental Care for Infants with Heart Disease, University School of Nursing, Baltimore, Maryland" there was a high statistically significant difference in nurses practice with infants who has congenital heart disease after feeding ptotocol implementation compare to pre educational program.

According to length of hospital stay among studied infant with congenital heart disease, the present study noticed that, less than half 47.1% of infants before program implementation are stayed in hospital for a period 7<-14 days compared to more than one infants quarters of after program implementation, with statistically high significant differences (p=0.000).

The current study was in the same line with the study done by Kataria et al., (2021), entitled "The relationship between feeding preoperative exposures and postoperative outcomes in infants with congenital heart disease" and noted that, there was high statistically significant differences in length of hospital stay among studied infant with congenital heart disease post feeding ptotocol implementation compared to pre feeding ptotocol. While the current study was in disagreed with study done by Ahuja et al., (2021), entitled "Acute respiratory infections in hospitalised infants with congenital heart disease, Cambridge University" and noted that, length of stay was longer (14.7 versus 12.2 days, p < 0.001), Correlation between total score of knowledge of studied nurses and total score of practice the current study reveals that, there is no significant correlation between total score of knowledge and total score of practice at before and after protocol of feeding implementation phases.

The present study was in same opinion with the study done by **Ahuja et al.**, (2021), entitled "Acute respiratory infections in hospitalised infants with congenital heart disease" and noted that, there was no significant correlation between total score of knowledge and total score of practice at before and after program implementation phases.

While the present study was in disagreed with the study done by **Khan et al.**, (2022), entitled "nurses knowledge regarding An infant with patau syndrome associated with

congenital heart defects" and noted that, there was significant correlation between total score of knowledge and total score of practice at before and after program implementation phases.

Correlation between level of knowledge of nurses and infant outcome, the present study revealed that, there is no statistically significant correlation between total score of knowledge and length of hospital stay, weight gain, SBP at before and after program implementation phases. Meanwhile, there is statistically significant correlation between total score of knowledge and DBP after program implementation at p-value (0.049).

The current study was supported with **Samanidis et al., (2022),** and noted that, there was no statistically significant correlation between total score of knowledge and length of hospital stay, weight gain, systolic blood pressure regarding infant with congenital heart disease.

Also the current study illustrated that, there is no significant correlation between total score of practice and infant outcome at before and after protocol of feeding implementation phases. The present study was in the same line with the study done by **Delaney et al.**, (2022), entitled "The associations between resilience and socio-demographic factors in parents who care for their children with congenital heart disease" and noted that, there is no significant correlation between total score of practice and infant outcome. Also this findings in agreed with the study done by Varela-Chinchilla et al., (2022), entitled "Congenital Heart Disease: The State-of-the-Art on Its Pharmacological Therapeutics. Journal Cardiovascular of Development and Disease".

Conclusion

The research hypotheses are accepted, more than one third of the studied nurses had poor level of knowledge pre feeding ptotocol implementation. Meanwhile, the majority of them have good total score of knowledge post feeding ptotocol implementation. Also, the majority of the studied nurses had competent practice post feeding ptotocol in implementation compared to, more than one quarter of them had incompetent practice level pre protocol of feeding implementation and feeding ptotocol was effective in improving nurses' knowledge and practices regarding effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases pre and post feeding ptotocol implementation. In addition. there was positive correlation between nurses' total level of knowledge and practices pre and post feeding ptotocol implementation.

Recommendations

1.Conducting regular training program about implementing feeding ptotocol and workshops for nurses regarding effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases pre and post program implementation.

2.Developing guidelines for nurses about effect of post-operative protocol of feeding for nurses on improving nutritional outcomes of infants with congenital heart diseases pre and post program implementation to improve infants outcomes.

3.Further studies should be conducted to replicate the study on a larger sample and multiple settings like ENT, trauma, oncology, neurology and neurosurgery for generalization of results.

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تأثير بروتوكول التغذية ما بعد العملية الجراحية على تحسين النتائج الغذائية للرضع المصابين بأمراض القلب الخلقية

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تعتبر أمراض القلب الخلقية بين الأطفال من أخطر الأمراض التى تهدد الحياة وتتطلب جراحة أو تدخل قسطرة خلال السنة الأولى من الحياة. لذا هدفت هذه الدراسة الي تقييم تأثير بروتوكول التغذية ما بعد العملية الجراحية على تحسين النتائج الغذائية للرضع المصابين بأمراض القلب الخلقية. وقد أجريت هذه الدراسة في في وحدة العناية القلبية للأطفال ووحدات العناية المركزة للأطفال في مستشفى الأطفال التخصصي في مدينة بنها. وقد اشتملت العينة على جميع الممرضين الذين يعملون في الأماكن المذكوره سابقًا لمدة ستة أشهر و عينة هدفة من اشتملت العينة على جميع الممرضين الذين يعملون في الأماكن المذكوره سابقًا لمدة ستة أشهر و عينة هدفة من تلث (36.3٪) من الممرضين الذين يعانون من عيوب القلب الخلقية بعد العملية الجر احية. وأظهرت النتائج أن أكثر من تلث (36.3٪) من الممرضين الخاضعين للدر اسة لديهم مستوى ضعيف من المعرفة فيما يتعلق بتأثير بروتوكول التغذية للرضع المصابين بأمر اض القلب الخلقية قبل تنفيذ البرنامج التعليمي. ولكن بعد تنفيذ البرنامج التعليمي ، لتناث (36.3٪) من الممرضين الخاضعين للدر اسة لديهم مستوى ضعيف من المعرفة فيما يتعلق بتأثير بروتوكول التغذية للرضع المصابين بأمر اض القلب الخلقية قبل تنفيذ البرنامج التعليمي ، ولكن بعد تنفيذ البرنامج التعليمي ، كان لدى الغالبية منهم (88.2٪) درجة إجمالية جيدة من المعرفة حول تأثير بروتوكول التغذية على تحسين النتائج الغذائية للرضع المصابين بأمراض القلب الخلقية. وكشفت الدراسة الحالية عن عدم وجود علاقة ذات دلالة بحصائية بين الدرجة الكلية للممارسة وطول الإقامة في المستشفى ، وزيادة الوزن وتقييم الجروح في مرحلتي ما الغذائية الرضع المصابين بأمراض القلب الخلقية. وكشفت الدراسة الحالية عن عدم وجود علاقة ذات دلالة بحصائية بين الدرجة الكلية للممارسة وطول الإقامة في المستشفى ، وزيادة الوزن وتقييم الجروح في مرحلتي ما درجات المعرفة وطول الإقامة في المستشفى ، وزيادة الوزن وتقييم الجروح في مرحلتي ما درجات المعرفة وطول الإقامة في المستشفى ، وزيادة الوزن ، وتقييم الجروح وي مرحاقي الارضع درجات المعرفة وطول الإقامة في المستشفى ، وزيادة الوزن ، وتقيم الجروح بعد تنفيذ البرضام. وتشائج الرضع