

Effect of Guiding Program on Mothers' Knowledge, Reported Practices, and Self-Efficacy Regarding Care of Their Children Undergoing Cardiac Catheterization



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1- ABSTRACT

Background: Cardiac catheterization is an invasive technique to examine how well your heart is working and is used to diagnose and treat some congenital heart problems. **Aim:** The aim was to evaluate the effect of guiding program on mothers' knowledge, reported practices, and their self-efficacy about care of their children undergoing cardiac catheterization. **Method:** Quasi-experimental research design (One-group pre and post-test) in Pediatric Cardiology Department and Cardiac Catheter Unit, affiliated to Mansoura University Children's Hospital, with 60 mothers and their children. **Tools of data collection:** tool 1: Structured Interview questionnaire sheet and tool 2: General Self-efficacy Questionnaire (GSQ) **Results:** the mothers under the study had good knowledge regarding cardiac catheterization before and after the guiding program. Also, the mothers reported satisfactory practices after implementing the guiding program, with statistically significant differences. Moreover, there was an increase in mothers' self-efficacy after conducting the guiding program than before. **Conclusion:** The cardiac catheterization guiding program was successful for raising mothers' knowledge, reported practices, and self-efficacy about care of their children getting cardiac catheterization. **Recommendations:** Organize continuous teaching sessions for mothers of children undergoing cardiac catheterization at inpatient and outpatient cardiology unit.

Keywords: Cardiac Catheterization, Guiding Program, Mothers Self-efficacy

2- Introduction:

Congenital heart defect (CHD) is referred to as a structural abnormality in the heart or great vessels that is present at birth. (Diab, et al., 2021). Globally, it is represented as 8-12/1000 live births and about thirty percent to forty percent of all congenital defects. While in Egypt, the prevalence ranged from 3.5-17.5 per 1000 live births. (Al-Fahham & Ali, 2021). Cardiac catheterization (CC) is a sterile procedure that uses a radiopaque catheter placed into the heart through a peripheral blood artery in order to diagnose the heart abnormalities. It gives information about cardiac output or stroke volume, oxygen saturation in the heart chambers and great vessels, and anatomic congenital anomalies such as septal defects or blockage (SCHN Policy, 2021).

Self-efficacy of the parents refers to parents' beliefs in their ability to positively influence their child's well-being, which plays a crucial role in promoting healthy functioning for children. The key to both parents' and children's healthy functioning is parental self-efficacy. It affects child development, parental psychological health, and child-parent relationship (Albanese, Russo & Geller, 2019). Reduced self-efficacy because cardiac catheterization can occur for different

reasons such as inadequate knowledge of the procedure, risks associated with it, preparation for and after the procedure, follow-up care plan, and potential complications (Daviu et al., 2019).

Women face many difficulties as they adjust to motherhood, including learning how to be a parent, adjusting to a new dynamic in the home, and accepting their new role as mothers. Several women struggle to handle the physical, social, and psychological obstacles that come with becoming first-time mothers. These issues are more prevalent in first-time mothers due to their lack of prior parenting experience (Wang et al, 2021). Mothers' perceived ability to maintain their organization and execution of diverse parenting tasks as valuable for parenting outcomes is known as maternal self-efficacy (MSE). Positive parenting is identified in parents with high MSE scores (Li & Liu, 2019).

Children with cardiac anomalies require comprehensive primary care as maintaining growth and development, feeding, physical activity, immunizations, dental care, different medications, and perioperative concerns for them Suklerttrakul, Pichansathian, Jintrawet & Chotibang, 2018). So, it is important to help mothers in acquiring practical knowledge, enhancing children care,

increasing self-efficacy, and a reducing disruption in daily functioning through performance of guiding program. (Mirghafourvand, Charandabi, Jafarabadi & Fathi, 2016). Therefore, evaluating the effect of guiding program on mothers' knowledge, reported practices, and self-efficacy about taking care for their children undergoing cardiac catheterization was important.

Aim of the Study

This research aimed to evaluate the effect of guiding program on mothers' knowledge, reported practices and self-efficacy about caring of their children undergoing cardiac catheterization.

Research Hypothesis

- H¹: knowledge of the studied mothers about cardiac catheterization will be improved post-implementation of guiding program.
- H²: Reported practices of the mothers about the care of their children undergoing cardiac catheterization will be better after performing the guiding program.
- H³: The self-efficacy of the mothers in the care of children undergoing cardiac catheterization will be improved after accomplished of the guiding program

3- Method

3.1 Research Design

A quasi-experimental design was used.

3.2 Setting

The pediatric cardiology department and cardiac catheter unit at Mansoura University Children's Hospital (MUCH), which treats children from Mansoura and the surrounding Dakahlia Governorate as well as its neighborhood, served as the study's sites.

3.3 Subjects

A convenient sample of sixty mothers and their children with congenital heart defects (cyanotic and cyanotic heart defects) who were undergoing cardiac catheterization and cardiac catheter unit were chosen within six months of the previous settings. The age of the studied children was between 6 - 12 years with both genders.

3.4 Tools of data collection:

Tool I: A Structured Interview Questionnaire

The researcher developed this tool after reviewing recent literature about the subject (Mohamed, Ibrahim, & Elsis, 2018). It was translated into Arabic language and divided into three parts:

Part I: It is composed of

A. Characteristics of studied mothers:

It included: age, educational background, residence, occupation, social status, family income, and number of family members, sources of mothers' information about cardiac catheterization.

B. Characteristics of studied

children: It included: age, gender, birth order, diagnosis, disease duration, and length of hospital stay.

C. Data about child's health condition, which included time of diagnosis, age of children that discovered the disease, family history, a family member suffered from the disease, previous hospitalization, and previous cardiac catheterization, chief complaints, diagnostic tests, complications from catheterization, conscious level, skin characteristics, and status of the insertion site.

Part II: Mothers' Knowledge About Cardiac Catheterization

It consisted of MCQ questions and was gathered by the researcher covered the following items: definition, indications, purpose, and complications of cardiac catheterization, possibility of performance of CC more than one time, duration of CC, diagnostic tests replace CC, contra-indications, required time for rest after CC, signs of infection after CC, appropriate and non-appropriate foods required after CC, activities allowed and not allowed after CC, and time to call physician and the nurse after CC.

Scoring System

Knowledge obtained from the studied mothers' answers will be scored and calculated. Their answers were checked against the predesigned model key answer prepared previously by the researcher, where each complete correct answer was scored two, incomplete correct was scored one, and zero for incorrect or unknown answers. The mothers' knowledge total score was thirty-four converted into percentages as follows:

- Poor knowledge if the score is <50% (< 17 marks)
- Average knowledge if the score is from 50<75% (17 < 25.5 marks)
- Good knowledge if the score is ≥75% (25.5 marks) (Abdel-Salam & Mahmoud, 2018).

Part III: Assessment of the reported practices of the mothers about caring of children undergoing cardiac catheterization: It is formulated of 19 close-ended multiple-choice

questions to assess mothers' reported practices regarding care of children undergoing cardiac catheterization before and immediately after the procedure. It covered the care provided for children pre-cardiac catheterization and included three items as nutrition, medication, and hygienic care while, immediate post-care of children included seven items as position, care of insertion site, fluid intake and output, medication, child's activity, personal hygiene and follow up. The mothers were asked if the care of children undergoing cardiac catheterization was done or not done.

Scoring System

The reported practices were scored (2) for each complete correct done, incomplete correct done were scored (1) and (0) for each incorrect or not done, A mean score for the part was obtained by adding up all of the item scores and dividing the result by the total number of items. The percent scores for these scores were computed. If the percentage score for the mothers' reported practices was seventy percent or higher, it was satisfactory; if it was below seventy percent, it was unsatisfactory (Mohammed, Mohammed, & Abd Elaty, 2019)

Tool II: General Self-Efficacy Questionnaire (GSQ)

Schwarzer and Jerusalem, (1995) developed this scale to predict coping and adaptation with daily difficulties and different types of stressful life events. The researcher adopted this scale to measure the mother's ability to care of her child. It consisted of 10 sub-items that focused on different skills and components of problem-solving approaches. Each item referred to successful coping and implied an internal stable attribution of success. This tool demonstrated good psychometric characteristics with adequate reliability. Its Cronbach's alphas ranged from 0.76 to 0.90 with in high majority about 0.80 and adequate validity.

Scoring System

Every item has four options based on the Likert scale, one equal not at all true, two equal hardly true, three equal moderately true, and four equal exactly true. The scores for each item collected from the mothers under study were assessed. The final composite score was calculated by adding up all of the items, which ranged from ten to forty with a mean cut point of twenty. Higher self-efficacy was indicated by a higher score.

Self-efficacy's total score was classified as:

- High self-efficacy equal to or more than sixty percent.
- Low self-efficacy less than sixty percent. Abdel-Salam & Mahmoud (2018).

Validity:

The content validity of the tools was assessed and revised by a panel of five experts in the field of pediatric nursing. It was revised for its clarity, content, sequence of items, and relevance or irrelevance of content to measure the extent to which the scores represent the variables they intended to measure.

Reliability

Cronbach's alpha coefficient test was used for study tools in SPSS program version 22 by a statistician. It was measured to evaluate whether all items on the study items of the tools measure the same variable over time and well the study items fit together consequently.

- Internal consistency reliability (Cronbach's α) for a tool I part I about mothers' knowledge about cardiac catheterization and part 2 about mothers' reported Practices about the care of their children undergoing cardiac catheterization was 0.825 and 0.849 respectively which indicates a good level of internal consistency
- Cronbach's α test for tool II (GSQ) emerged as good, which was 0.80.

Pilot Study

A pilot study was conducted using a sample of 10% mothers who were the subjects of the study and their cardiac catheterization-undergoing children ($n = 6$ per child) who were kept in the cardiac catheterization unit. It was done before the collection of data in order to assess the study design applicability, timeliness, cost-effectiveness, and adverse events before using the study instruments. In light of the pilot study's subjects, the appropriate adjustments were made. The subjects in the pilot study after that, were taken out of the sample.

Administrative Stage

- A formal letter was issued from the faculty of Nursing, Mansoura University to the appropriate authorities in the chosen setting Mansoura University Children's Hospital to take permission about study.
- The heads of the cardiology department and pediatric cardiac catheterization unit provided verbal consent for the study to be conducted after explaining the aim of the study.

Fieldwork

It was carried out according to four phases:

I- Assessment phase:

- Each mother was assessed individually for her knowledge about cardiac catheterization, data about child's health condition, and reported practices about the care of their children undergoing cardiac catheterization through a structured interview sheet using a tool I (part I, (A&C), part II, part III).
- Each studied child was interviewed individually to collect his/her demographic characteristics using a tool I part I, (B)
- Mother's actual self-efficacy regarding the care of their children undergoing cardiac catheterization through the general self-efficacy scale was assessed using tool II.

II. Planning phase :

- In order to meet the needs of mothers and children for information regarding mothers' self-efficacy in caring of their children undergoing cardiac catheterization, priorities and expected outcomes were developed based on the assessment phase's findings.
- The program's content was created by the researcher, written in simple Arabic, and supported by images to make it easier for understanding. The guiding program covered both theoretical and practical skills.
- The theoretical skills as definition, indications, purpose, and complications of cardiac catheterization, possibility of performance of CC more than one time, duration of CC, diagnostic tests replace CC, contra-indications, required time for rest after CC, signs of infection after CC, appropriate food and non-appropriate food required after CC, activities allowed and not allowed after CC, and time to call physician, nurse after CC.
- The practical skills as nutrition, medication, personal hygiene, position, care of insertion site, fluid intake, and output, follow-up, and child activity.

III. Implementation phase:

- The development and implementation of the guiding program for the mothers under study were predicated on the results of the assessment and the literature review. Three sessions total two theoretical and one practical were held for this program. Each one took from thirty to forty-five minutes.

- The study's data was collected over a six-month period, starting on October 1, 2022, and ending on March 31, 2023. The researcher was available for data collection three days a week (Sunday, Tuesday, and Wednesday) from 10 in the morning and 1 afternoon at the cardiology department and cardiac catheter unit.
- The studied mothers and their children in the previously established settings were divided into small groups, three in each group and they received the sessions during the morning and afternoon shifts. In addition, a variety of teaching media, including PowerPoint, videos, and handouts (educational booklets) about pre and post-care regarding cardiac catheterization were used.

IV. Evaluation phase:

- Mothers' knowledge, reported practices and self-efficacy were reassessed immediate post cardiac catheterization (post-test) after using the previously mentioned study tools to evaluate the effect of the guiding program on mothers' knowledge, their reported practices and their self-efficacy.

Ethical Considerations

The Faculty of Nursing at Mansoura University's Research Ethics Committee granted ethical approval. After clarifying the study aim and the privacy and confidentiality of the collected data, the mothers of the study gave their oral consent to take part. These mothers received assurances that they would have no obligations should they decide to leave the study at any time. Children who agreed to engage in the research were also asked for their consent after being given a brief explanation of its purpose. Data confidentiality and anonymity were guaranteed, and it was only used for study.

Statistical Analysis

The collected data was coded, categorized, statistically analyzed, and presented in numbers, percentages, tables, and figures as required. Suitable statistical tests were used to test the significance of the obtained results such as arithmetic mean (X), standard deviation (SD), Wilcoxon signed ranked Z test, Pearson's chi-square test (χ^2), Monte Carlo exact test, Fisher exact test (FET), paired sample t-test and Pearson's correlation(r) coefficient are used.

4- Results:

Table (1) illustrated that 55% of studied mothers were aged from twenty to less than thirty years old with a mean age of 30.31 ± 5.87 years.

53.3% of them were in secondary education. Also, concerning the residence of studied mothers, 71.7% of them were in rural residences, and 96.7% of them were married. Moreover, 63.3% of them had enough family income, and 50% had four members in the family.

Table (2) showed that 68.3% of studied children were aged from six to less than nine years with a mean age of 7.76 ± 2.38 years. About more than half of them were girls. Also, 51.7% of them were the second child. Additionally, 28.3% of them had ventricular septal defect, and 33.3% of them had a disease duration of less than 1 year. Moreover, 63.3% of them stayed from three to four days in the hospital.

Table (3) clarified that 28.3% had dyspnea and 15% of the studied children had cyanosis as chief complaint before cardiac catheterization. 91.7%, 96.6% & 95% had echo as a diagnostic test, hadn't complications after a cardiac catheterization, and were conscious respectively. Also, about 76.7% of them had warm skin after CC. Moreover, 81.7% of them had good status of insertion site after CC.

Figure (1) demonstrated that 63.3% of mothers had poor knowledge about cardiac catheterization before implementation of the guiding program compared to only 10% after the program, in contrast, 8.3% of them had good

knowledge before implementation of the guiding program compared to 55% of them after the program.

In **Figure (2)**, 71.7% of mothers had unsatisfactory reported practices regarding the care of their children undergoing cardiac catheterization before the program compared to 30% of them after the program.

Figure (3) demonstrated that 85% of mothers had low self-efficacy before implementation of the guiding program, which decreased to 28.3% of them C after implementation of the guiding program.

Table (4) showed that there was an extremely statistically significant positive correlation between mothers' knowledge and their reported practices before and after implementation of the guiding program at $p=0.000$.

Table (5) showed that there was a statistically significant positive correlation between mothers' knowledge and their self-efficacy ($p=0.022$ & $p=0.041$) before and after the implementation of the guiding program. Also, there was a highly statistically significant positive correlation between the total mothers' reported practices and their self-efficacy ($p=0.001$ & $p=0.007$) before and after the implementation of the guiding program.

Table (1). *Characteristics of the Studied Mothers.*

1). Characteristics of the Studied Mothers.

Characteristics of the mothers	n(60)	%
Age		
20 -< 30	33	55.0
30-< 40	24	40.0
40 and more	3	5.0
Mean ± SD (Min–Max)	30.31±5.87 (20-41 years)	
Educational level		
Illiterate	4	6.7
Read and write	13	21.7
Secondary education	32	53.3
High education	11	18.3
Residence		
Rural	43	71.7
Urban	17	28.3
Occupation		

Work	9	15.0
Don't work	51	85.0
Social status		
Married	58	96.7
Divorced	2	3.3
Family income		
Enough	38	63.3
Not enough	22	36.7
Number of family members		
Three	11	18.3
Four	30	50.0
More than four	19	31.7

Table (2). *Characteristics of the Studied Children Undergoing Cardiac Catheterization.*

Characteristics of the child	n(60)	%
Age		
6- <9 years	41	68.3
9- ≤ 12years	19	31.7
Mean ± SD (Min – Max)	7.76±2.38 (6-12 years)	
Gender		
Girl	31	51.7
Boy	29	48.3
Birth order		
First	19	31.3
Second	31	51.7
Third	6	10.0
Fourth and more	4	6.7
Child's Diagnosis		
Ventricular septal defect	17	28.3
Atrial septal defect	16	26.7
Patent duct arteriosus	11	18.3
Aortic stenosis	5	8.4
Did not know	11	18.3
Disease duration		
Less than 1 year	20	33.3
1 year to 2 years	13	21.7
And more 2 years	27	45.0
Length of hospital stay		
2- 4 days	38	63.3
5-10 days	13	21.7
More 10 days	9	15.0

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Table (3). Health Condition of the Studied Children Undergoing Cardiac Catheterization.

Child's Health Condition	n(60)	%
Chief complain before CC		
Cyanosis	9	15.0
Irregular heart beat	20	33.4
Dysphagia	3	5.0
dyspnea	17	28.3
Others (fever	6	10
Diagnostic tests that discover child's problem		
Ultrasound	5	8.3
Echo	55	91.7
Complications after CC		
No	58	96.6
Arrhythmia	1	1.7
Massive bleeding	1	1.7
Conscious level after CC		
Conscious	57	95.0
Unconscious	3	5.0
Skin characteristics after CC		
Warm	46	76.7
Cold	14	23.3
Status of insertion site after CC		
No symptoms	49	81.7
Hematoma	8	13.3
Pain	3	5.0

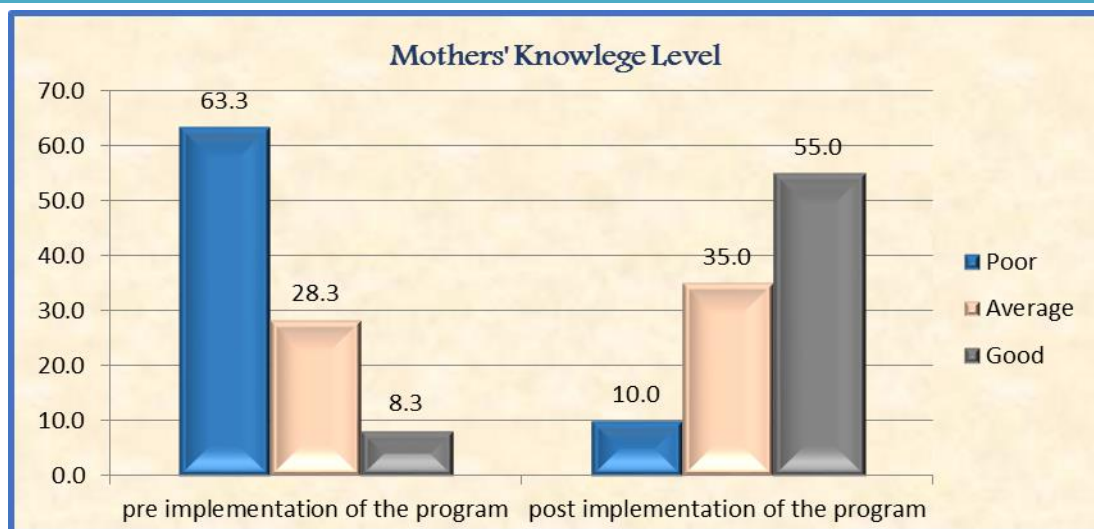


Figure (1). Distribution of Studied Mothers According to Total Knowledge Level before and after Implementation of the Guiding Program

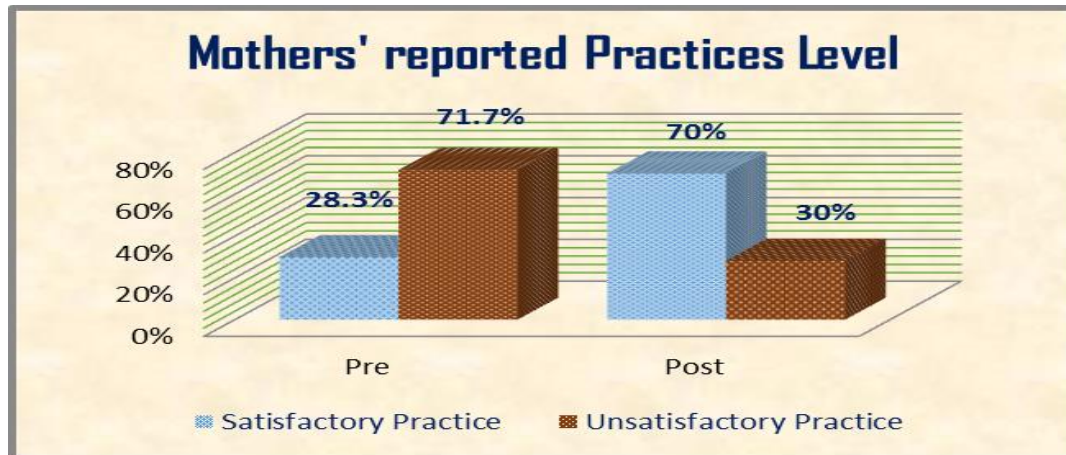


Figure (2). Distribution of Studied Mothers' Total Reported Practices about Care of Their Children Undergoing Cardiac Catheterization before and after Implementation of the Program.

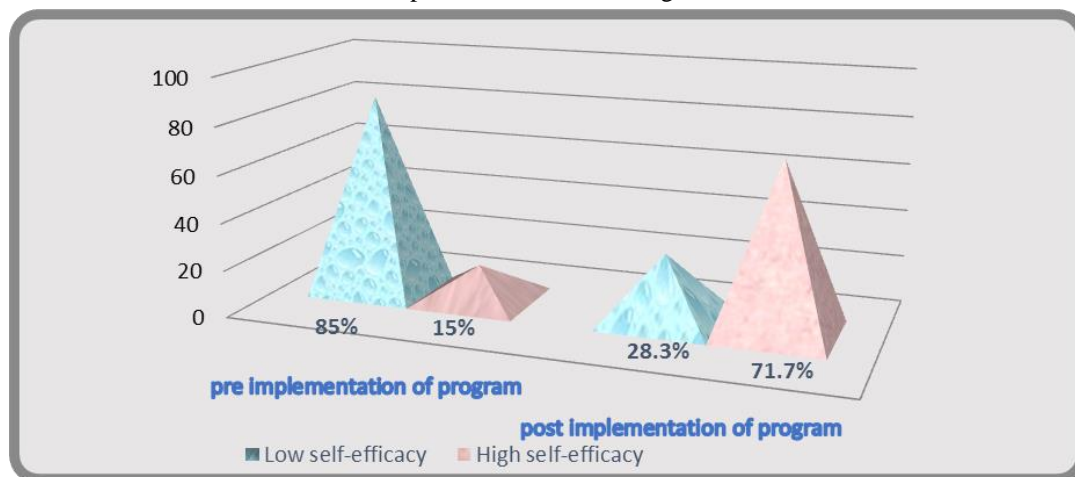


Figure (3). Distribution of the Studied Mothers' Self-Efficacy Level before and after Implementation of the Guiding Program.

Table (4). Correlation between Total Mothers' Knowledge level and their Total Reported Practices about the care of their children undergoing cardiac catheterization before and after the Implementation of the Guiding Program.

Item	Mothers' Knowledge Level			
	Pre-program		Post-program	
Total Reported Practices	r	p	r	p
	0.531	0.000**	0.543	0.000**

(**) extremely statistical significance at $p < 0.001$

Table (5). Correlation between Mothers' Self-Efficacy, their Total Reported Practices, and their Knowledge about Cardiac Catheterization before and after Implementation of the Guiding Program.

Item	Mothers' self-efficacy			
	Pre-program		Post-program	
	r	p	r	p
Mothers' knowledge level	0.296	0.022*	0.264	0.041*
Total reported practice	0.429	0.001*	0.345	0.007**

5- Discussion

A congenital heart defect is a problem in the structure of the heart that the child is born with it. Some congenital heart defects in children are simple and don't need treatment but other defects are more complex and may require several surgeries performed over a period of several years. Cardiac defects may be classified into cyanotic and cyanotic depending upon whether the infants clinically exhibit cyanosis (**Centers for Disease Control and Prevention, 2023**). Cardiac catheterization is an invasive procedure that permits diagnosis and treatment of cardiac problems among children. (**Chow et al., 2019**). So, this research aimed to evaluate the effect of guiding program on mothers' knowledge, reported practices, and their self-efficacy regarding caring of their children undergoing cardiac catheterization.

Regarding characteristics of the mothers, the present research revealed that more than half of the studied mothers aged from 20 to less than 30 years old with a mean age of 30.31 ± 5.87 (Table 1). The study of **Elsobky, Amer & Sarhan (2018)** who carried out a study in Egypt about the "Effect of pre-hospital discharge care program on mothers' knowledge and reported practice for children after congenital heart disease" was dis-coordinated with the current study and found that more than one third was above thirty with mean age 30.80 ± 3.27 . According to the researcher's view, this result might be explained by the middle-aged mothers in the study who were experiencing an increasing number of problems in their lives as they got older.

Furthermore, the findings showed that more than half of them had secondary education (Table 1). This result matched with **Abdel-Salam and Mahmoud (2018)** who carried out a study in Egypt about "Effect of educational program on the self-efficacy and quality of life of mothers caring for their children with congenital heart disease", they stated that less than three quarters of the studied mothers were technical diploma education. According to residence, slightly near three quarters of the mothers studied were from rural areas

(Table1). This result was supported from **Chiang Mai University (2019)** who conducted a study about "social support, parental self-efficacy, and care practices among parents of children with congenital heart disease, the democratic socialist republic of Sri Lanka ", they noted that more than three quarters of the mothers were from rural.

As regard mothers' occupational status the most of studied mothers has been housewives (table1). This research was in the line with **Mohammed, Ahmed, Esmat and Abd El-latef (2022)** who conducted a study about "mothers' health awareness toward their children undergoing congenital heart surgery "and stated that more than three quarters of the studied mothers were housewife. This explains the reason which may be due to lack of appropriate job opportunities for women and they were taking care of their children.

Concerning to the family monthly income, the present study appeared that, slightly less than two thirds of the studied mothers had just enough income (Table1). This finding was the same with (**El-Gendy, 2020**) who conducted a study in Egypt about "guiding program for mothers to improve the quality of life of children with congenital heart disease" and stated that near two thirds of the mothers had enough family income. According to the researcher, the family income reflect socioeconomic and political status of country, while Iraq is unstable but Egypt is stable.

In relation to the characteristics of the CHD children in our study, this finding showed that, over two thirds of the children were from 6-to 9-year-old age (Table 2). The results were inconsistent with a study by **Elsobky, Amer, and Sarhan (2018)** and reported that half of their sample was of school age. From the researchers' view, congenital cardiac disease is largely confirmed at this age.

In addition, the present research revealed that more than half of the children were girls (table 2). This finding is consistent with a study by **Begum and Kher (2018)** on the "Anthropometrics assessment of children with congenital heart disease," which found that the boys to girls ratio for

these children was 9:1. From the perspective of the researcher, this could be a variation in sample size.

Furthermore, the current study discovered that more than half of the children were ranked second in their birth order (Table 2). This research disagrees with **Elsharkawy and Morsy (2017)** who carried out a study about "Effect of an illustrated educational guide on anxiety level among parents of children undergoing cardiac catheterization" and found that more than three quarters of the study group with CHD were ranked as first. From the perspective of the researcher, the first birth order is the highest because less than three quarter of studied family have one or two children.

About the diagnosis of children, slightly less than a third of the children had a ventricular septal defect, and more than one quarter had an atrial septal defect (table 2). This study is coordinated with **Jan et al., (2023)** titled "Extracardiac birth defects in children with congenital heart anomalies" and stated that the majority of their sample had VSD followed by less than one-third of them had ASD. From the researcher's viewpoint, the most prevalent forms of CHD are ASD and VSD.

According to the current findings, less than one-fifth percent of the children studied had cyanosis as their primary complaint prior to CC, and more than one-quarter had dyspnea (table 3). This study was not in line with **Elgendy's (2020)** revealed that nearly two-thirds of the mothers reported having dyspnea and over one-third reported cyanosis as a symptom of the condition. According to the researcher, the most frequent complaint among children with congenital heart defects is dyspnea and cyanosis.

Also, the study showed that the majority of children had no complications after cardiac catheterization (Table 3). This is mismatched with **Abd-Elshafy et al. (2015)** who found that post-operative anxiety is accompanied with cardiac procedures according to their research "Not all sounds have negative effects on children undergoing cardiac surgery". From the researcher's view, giving mothers' knowledge and practices about cardiac catheterization before the procedure reduced the anxiety for studied mothers and their children.

Moreover, regarding the conscious level of children, the majority of the studied children were conscious after cardiac catheterization (Table 3). This result went along with **Mohamed, Ibrahim, and Elsis (2018)** who performed research in Egypt

about "Effect of nursing guidelines for nurses on the occurrence of selected post-therapeutic cardiac catheterization complications among children" and stated that all studied children were conscious after admission to pediatric cardiac catheterization intensive care unit. Furthermore, our findings confirmed that more than two-thirds of the studied children had warm skin after cardiac catheterization (Table 3). This result was contrary with the previous study of **Mohamed, Ibrahim, and Elsis (2018)** who stated that after cardiac catheterization, the majority of children and less than two-thirds of them in the control group had cold extremities immediately.

The finding of this research showed that, near two-thirds of the mothers have poor knowledge preprogram compared to only one tenth had poor knowledge post-program (Figure 1). This agreed with the findings of **Ayad (2021)** stated that more than half have poor knowledge preprogram and this reduced post-program according to their titled "Effect of educational guidelines on mothers' emotional status regarding children undergoing cardiac catheterization". From the researcher viewpoint, this study improved mothers' knowledge after implementation of the program because of using various teaching media, and educational handout for them during teaching sessions.

This research showed that more than a quarter of the mothers have satisfactory reported practices before the implementation of the program compared to more than two-thirds post-program (Figure 2). This result was in agreement with **Ibrahim, (2023)** who studied "Effect of mothers' instructional guidelines on selected therapeutic cardiac catheterization outcomes among children" who stated that more than a quarter reported satisfactory practices preprogram while more than half of the studied mothers reported satisfactory practices after implementation of the program.

In terms of mothers' self-efficacy, the study result revealed that more than one tenth of mothers had high self-efficacy level before program, compared to more than two-thirds of them post-program (Figure 3). This result was similar with **Choi & Lee (2021)**, who studied "Coping self-efficacy and parenting stress in mothers of children with congenital heart disease and illustrated that enhanced coping self-efficacy by the effective practice of mothers with less supporters.

The current study showed that there was an extremely statistically significant positive correlation between total mothers' knowledge and their total reported practice before and after implementation of the guiding program (Table 4). The outcome was consistent with (Hamdy et al, 2022) according to their titled "The Impact of Fluid Flushed during Pediatric Cardiac Catheterization on Lung Ultrasonography Score in Egypt". They revealed that the mothers should be equipped with adequate knowledge and skills before cardiac catheterization for the best and quick recovery.

A statistically significant positive correlation between mothers' knowledge and their self-efficacy before and after implementation of the guiding program in our study was displayed (table 5). Also, a highly statistically positive correlation between total mothers' reported practices and their self-efficacy pre and post the program. This result was similar to Chiang Mai University (2019) who reported that an increase of parental self-efficacy aids parents in providing better care and that parents with high self-efficacy are more likely to provide better practices.

6- Conclusion:

According to the findings of this current study, it is concluded that the guiding program about cardiac catheterization was an effective method on improving mothers' knowledge, reported practices, and self-efficacy about care of their children undergoing cardiac catheterization.

7- Recommendations:

- Organize continuous teaching sessions for mothers of children undergoing cardiac catheterization about nutrition, medication, personal hygiene, position, care of insertion site, fluid intake and output, child activity and follow-up.
- Design an instructional nutrition programs for mothers and encourage them about regular follow-up for their children with congenital heart defect.
- Preventive measures about the risk of having an infant with a congenital heart defect should be activated by mass media and providing mothers with adequate knowledge and skills before and after cardiac catheterization.

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