Effect of Nurse-Led Intervention on Anxiety and Fatigue among Patients undergoing Cardiac Catheterization

Amira Mohammed Ali Hassan [(1)]**, Heba Mohammed Mahmoud Elhapashy** [(2)]**,**
Dena Eltabey Sobh Sobeh[(3)]**, Shymaa Elsayed Mosaad Mohammed** [(4)]

(1) Lecturer in Medical-Surgical Nursing Department, Faculty of Nursing, Suez Canal University
(2, 4) Medical-Surgical Nursing Department, Faculty of Nursing, Mansoura University
(3) Assist Professor of Medical-Surgical Nursing Department, Faculty of Nursing, Port Said University

Abstract

Background: Nurses are qualified to provide effective nursing interventions in the management of patients undergoing cardiac catheterization; nurses-led interventions for patients undergoing cardiac catheterization have many advantages as reducing anxiety and fatigue. **Aim:** To evaluate effect of the nurse-led intervention on anxiety and fatigue among patients undergoing cardiac catheterization. **Design:** A quasi-experimental research design was used in this study. **Sample**: A convenient sample of 100 patients was undergoing cardiac catheterization that randomly was divided into two groups**. Setting:** This study was conducted at catheterization unit at Mansoura University Hospital. **Tools**: the used tools were: (I) an interview structured questionnaire, (II) Spielberger's State Anxiety Inventory (SSAI), and (III) Fatigue assessment scale. **Results:** The results of this study revealed that there were significant differences in anxiety and fatigue level among patients undergoing cardiac catheterization in the control group compared with study group after the nurse-led intervention at (P < .001). **Conclusion:** The current study concluded that nurse-led intervention had highly statistically significant positive on reducing anxiety and fatigue level among the studied patients undergoing cardiac catheterization in study group than control group**. Recommendations:** Replication of the current study with a larger sample of patients undergoing cardiac catheterization in different settings is required for generalizing the results

Keywords: Anxiety, Fatigue, Nurse-led intervention, Patients undergoing cardiac catheterization.

Introduction:

Cardiac catheterization is a procedure in which a thin, flexible tube (catheter) is guided through a blood vessel to the heart to diagnose or treat certain heart conditions, such as clogged arteries or irregular heartbeats. A cardiac catheterization gives doctors important information about the heart muscle, valves, and its blood vessels. During cardiac catheterization, doctors can do different heart tests, deliver treatments, or remove different cardiac cells for examination. Some heart disease treatments such as coronary angioplasty and coronary stenting are done using cardiac catheterization (**Hockenberry, Wilson, & Rodgers, 2016**).

Cardiac catheterization is a treatment used to diagnose and treat several heart conditions like arrhythmias, angina, or cardiac valve problems. Cardiac catheterization may be done during the diagnosis or treatment of coronary artery disease, congenital heart disease, heart failure, and microvascular heart disease (**Delgado, Saraste, Dweck, Bucciarelli-Ducci, & Bax, 2020).**

High levels of anxiety have been linked to poorer outcomes in people with cardiac catheterization. Anxiety is defined as a state in which a person feels apprehensive and their autonomous nervous system is activated in response to a vague and unclear threat (**Spielberger, 2019**). High levels of anxiety have been linked to a reduced immunological response as well as changes in cardiovascular function such as heart rate variability, endothelial dysfunction, and vascular inflammation, all of which can lead to poor clinical outcomes (**Renna, Hoyt, Ottaviani, & Mennin, 2020).** One of the most prevalent and debilitating side effects of cardiac diagnosis and therapy is fatigue. Generalized weakness, poor mental concentration, insomnia or hypersomnia, and emotional changes are all clinical symptoms of fatigue, and they all have a substantial impact on patients' overall life during and after treatment. (**Almanzlawi, & Ahmed, 2018**)

Cardiac catheterization is generally an elective procedure in which an asymptomatic patient with heart disease follows a protocol

that requires admission to the hospital. Waiting for the procedure can be a major source of stress and anxiety. These feelings are directly related to the invasive nature of the procedure and uncertainties related to diagnosis (**Balon, Rafanelli, & Sonino, 2018**). Furthermore, leaving home and family, the nature of the hospital environment, communication with nurses, and the nature of the sickness and its threats all contribute to patients' fear of hospitalization. When compared to depression, anxiety in cardiac catheterization patients is less focused. However, new research shows that anxiety, regardless of the severity of the illness, depression, or health practices, is linked to an elevated risk of mortality and complications (**Iozzia, et al., 2018**).

Nurses can use a variety of non-pharmacological approaches to lessen the anxiety of patients undergoing cardiac catheterization to reach satisfactory treatment goals, stress management methods of Benson's relaxation occurred according to the following steps: sit quietly in a comfortable position, close eyes, deeply relax all muscles, beginning at feet, progressing up to face, and keep them deeply relaxed, and breathe through nose (**Abu Maloh, et al., 2021**). Deep breathing also goes by the names of diaphragmatic breathing, abdominal breathing, belly breathing, and paced respiration. The air coming in through the nose fills the lungs, and the lower belly rises (**Merrill-Washington, 2020**).

Guided imagery is a form of focused relaxation that helps create harmony between the mind and body. It is a way of focusing imagination to create calm, peaceful images in mind, thereby providing a "mental escape." Guided imagery provides a powerful psychological strategy that enhances a person's coping skills. Imagery involves all the senses, as well as one's whole body and emotions. It is a way of viewing ideas, feelings, experiences, and interpretations. Imagery can stimulate changes in bodily functions such as heart rate, blood pressure, and respiratory patterns. It can help tab inner strengths to find hope, courage, and other qualities that can help cope with a variety of conditions. Almost anyone can use this technique. Patients participate in a guided imagery experience with a qualified practitioner. Calm, soothing music with or without nature sounds may be used. Patients also learn how to create their images and/or use previously created tapes (**De Paolis et al., 2019**).

Effective nursing education reduces patient anxiety and enhances recovery According to **Malek, Zakerimoghadam, Esmaeili, & Kazemnejad, 2018**), 26% of cardiac patients suffer from fatigue, and 42% of patients suffer from anxiety. Meanwhile, **Ahmad, & Ayasrah, (2020)** discovered that 20% of patients were afraid of having cardiac surgery. Anxiety is influenced by a fear of making mistakes during surgery, of the consequences, and a lack of control during the operation (**Ali, Masih, Rabbi, & Rasheed, (2020).**

Significance of the study:

Heart diseases are responsible for 50% of cardiovascular death bed globally. 12.8% of all-cause of death and 29.4% in Egypt. 17% of emergency units is chest pain complain. 8-10% of them need catheterization. The need for cardiac catheterization has been increased. It is a less invasive safe procedure with a high profit. It is reducing hospital stay, wait time, and list for diagnosis and treatment (**Mohamed, et al., 2021**).

Anxiety has a direct impact on the immune system and the post-surgery healing process, lowering the quality of life. Researchers have been concerned with educational intervention and measurement of its effects on the patient's anxiety level, and that the nurse's effective communication role, supportive care, and application of anxiety and fatigue-reduction methods along with education have been less focused **on** (**Hernández-Avalos, et al., 2021**).

Moreover, little research has been done about the effect of the nurse-led intervention on anxiety and fatigue among patients undergoing cardiac catheterization. Sufficient support and knowledge for patients about cardiac catheterization may reduce their anxiety and fatigue levels and indirectly achieve better outcomes for patients. Hence, the researchers decided to examine the effect of the nurse-led intervention on anxiety and fatigue among patients undergoing cardiac catheterization.

Aim of the study

To evaluate the effect of the nurse-led intervention on anxiety and fatigue among patients undergoing cardiac catheterization through:
- Assessing anxiety level among patients undergoing cardiac catheterization.
- Assessing fatigue level among patients undergoing cardiac catheterization.
- Evaluating anxiety and fatigue level among patients undergoing cardiac catheterization after the nurse-led intervention.

Research hypothesis:

Nurse-led intervention among patients undergoing cardiac catheterization would have a positive effect on reducing their anxiety and fatigue levels.

Subjects and Method:

Research design:

A quasi-experimental research design was used in this study in which the selected patients were randomly assigned into one of two groups to compare the real effectiveness **(Maciejewski, 2020).**

Setting:

This study was conducted at cardiac catheterization unit at Mansoura University Hospital, Egypt, this setting was selected due to the high prevalence of patients in the selected setting, and also it provides all types of health services for all Mansoura population.

Subjects:

A convenient sample of 100 patients was undergoing cardiac catheterization that randomly was divided into two groups within six months from the beginning of August 2020 till the end of January 2021. They were randomly assigned into two equal groups and divided into two study and control groups (50 patients in the study group who received nurse-led interventions and routine care and (50 patients in the control group who received routine care only).

Data collection tools:

Three tools were being developed to collect the current data; as follows:

The tool I: Interview structured questionnaire; it developed by researchers based on the relevant literature review; and divided into two parts:

Part one: It included demographic data as age; gender, patient's education, and residence.

Part two: It included patient's knowledge about cardiac catheterization as it included twenty (20) questions developed by the researchers to assess patient's knowledge regarding their cardiac catheterization such as the meaning, indications, complications, post-care and other questions related to cardiac catheterization.

Scoring system:

The total patient's knowledge percentages were calculated for known and unknown answers. Each complete correct answer was given (2 marks) and an incomplete answer was given (1) and (zero mark) for wrong or unknown answers. The total score of forty marks reflected 100% and then categorized as follows: (satisfactory and unsatisfactory). The satisfactory level reflected a score from 50% to 100% and the unsatisfactory level reflected a score below 50%.

(II) Spielberger's State Anxiety Inventory (SSAI): (Spielberger's, 1983)

Spielberger's State Anxiety Inventory was used to measure participants' situational anxiety in both study and control groups on the day of admission and the night before the surgery. Spielberger's State Anxiety Inventory consisted of 20 items and its score ranged from 20 to 80. A higher score indicated severe anxiety: 20 to 31 indicated mild anxiety, 32 to 42 mild to moderate anxiety, 43 to 53 moderate to high anxiety, 54 to 64 almost severe, 65 to 75 severe, and 75 extremely severe anxiety.

(III) Fatigue assessment scale.

This tool was adopted from **Kleijn, De, Wijnen, & Drent, (2011)**, it was a self-developed rating scale consisting of 10 items (which assess fatigue level of individuals during various activities in a week in terms of physical, social, psychological, and spiritual domains and their relationship with time of the day). Scores ranged from 0 (no fatigue) to 10 (worst possible) with a total score ranged from

0 to 100. No fatigue, very little, mild, moderate, severe, worst denoted 0, 1-9, 10-30, 31- 60, 61-80, 81-100 respectively. The reliability of the scale was considered good with Cronbach's alpha of 0.81 for the total score.

Validity of the tools:

The content validity of the tools and the instructional guideline, its clarity, comprehensiveness, appropriateness, and relevance were reviewed by five experts' professors; two experts in medical-surgical nursing and three experts in the cardiac surgery field. Modifications were made according to the panel judgment to ensure sentence clarity and content appropriateness.

Reliability of the tools:

The Cronbach's α test was used to assess the reliability of the questions relating to knowledge, which was 0. 87. **Kalhoran and Karimollahi, (2007)** reported the reliability and validity of the SSAI was 0.93 using Cronbach α. and the reliability of the third tool was 0. 81.

Pilot study:

A pilot study was done by 10 % of the study subjects (10 patients) before starting the actual data collection; to evaluate the effectiveness of the study tools, clarity, techniques, and the availability of the study sample; and subjects who participated in the pilot study were excluded from the study sample.

Ethical considerations:

Official permission for conducting the study was obtained from the Faculty of Nursing after a complete explanation of the study purpose and data collection procedure. The researchers obtained official permission from the hospital manager, the executive of the Mansoura University Hospital, and the head nurse of the cardiac catheterization unit.

Oral consent was obtained from the patients to participate in the study; the contributors were informed that participation in this study was voluntary and they could withdraw at any time without giving reasons. The purpose of the study was explained to

them and they were reassured that any information obtained would be confidential and used only for the study purpose.

Fieldwork:

- Data Collection was within six months from the beginning of August 2020 till to the end of January 2021. They were randomly assigned into two equal groups and divided into two study and control groups (50 patients in the study group who received nurse-led interventions and routine care and (50 patients in the control group who received routine care only).

- Researches were attended the previously mentioned setting for data collection two days per week, from 9 am to 12 Pm.

- Before the intervention, the interview questionnaire, Spielberger's State Anxiety Inventory, and fatigue-assessment scale were administered.

- Teaching methods included group discussion, models, and pictures.

- In the study group, the researchers interviewed each patient individually for about one hour according to the patient's level of understanding and their comfort; the researchers introduced themselves to the patient's and explained the aim of the study, as well as oral consent, was obtained from them then demographic, Spielberger's State Anxiety Inventory, and fatigue assessment scale were collected from the patients with nurses led interventions.

- As patients hospitalized at least one day before the surgery, the researcher performed the intervention for at least one consecutive day in the intervention group.

- The first day nurses led interventions included (1) the establishment of communication between the researcher nurse and the patients; (2) an overall explanation of the procedure; (3) encouragement of the patient to speak about anxiety, fear, and its causes and correcting patients' misconceptions, and (4) introduction of stress management methods of Benson's relaxation, deep breathing, guided imagery, repetition of prayers, and practicing of preferred stress management

methods (to make sure that the patient properly learned).

- The intervention group was instructed by the researchers who had sufficient knowledge about stress management to perform the Benson relaxation technique to the intervention group two times a day for 10 minutes

- While reviewing the subjects, the first session, the patients were encouraged to introduce issues obsessing their minds; the researcher answered their questions. Then the selected stress management method was practiced by the patients, and they were advised to use this method before sleep.

- The duration of each intervention session was about 45 to 60 minutes, which was adjusted based on the patient's needs. Both study and control groups received routine care including medications and controlling the hemodynamic status of patients. Patients in both groups filled SSAI the night before the surgery and were fatigued on the day of surgery.

- The subject contents have been sequenced through 4 sessions (2 sessions for theoretical part and 2 sessions for practical part), the total subjects divided into 6 group, each group included 10 patients, and each session took about 20-30 minutes. The total time was 2 hours for each one.

- In the control group, the researchers interviewed each patient individually for about 30 minutes; the researchers introduced themselves to them and explained the aim of the study, as well as oral consent was obtained from them then demographic, Spielberger's State Anxiety Inventory, and fatigue assessment scale were collected from the patients without nurses led interventions.

Statistical analysis:

Data were coded and transformed into a specially designed format suitable for computer feeding. All entered data were verified for any errors. Data were analyzed using statistical package for social sciences (SPSS) version 20 windows and were presented in tables and graphs. Chi-square analysis was performed

independent sample t-test, repeated measures ANOVA, and mean and standard deviations were computed. P-value at 0.05 was used to determine significance regarding:

• P-value > 0.05 to be statistically insignificant.

• P-value ≤ 0.05 to be statistically significant.

• P-value ≤ 0.001 to be highly statistically significant.

Results:

Table (1): Represents that (72% and 74%) of the studied patients in the study and control groups respectively, were between 40 < 60 years old. Males constituted 58% in the study group compared to 56% in the control group. Concerning education (44%) of patients had secondary education in the study group compared to 66% in the control group, 62% were living in urban residence in the study group compared to 70% in the control group.

Figure (1): Portrays that 83% of the studied patients reported that their main source of information about knowledge regarding cardiac catheterization was doctors.

Table (2) illustrates the effect of nurse-led interventions on patients' knowledge regarding cardiac catheterization. It was observed that the highest percentage of the patients had satisfactory knowledge regarding cardiac catheterization in all items post nurses led interventions in the study group compared to the control group and there was a highly statistically significant difference between patients' knowledge in both groups ($P<0.001$).

Table (3): Illustrates that there was an improvement in the studied patient's total knowledge level post-nurses-led interventions in the study group compared to the control group. There was a highly statistically significant difference between total knowledge level regarding cardiac catheterization in both groups (P-value <0.000).

Table (4): Shows that there was no a statistically significant difference between the study and control groups regarding the mean anxiety score (P > 0.05) pre the intervention. Furthermore, there was a highly statistically significant difference between the study and control groups regarding the mean anxiety score post the intervention. This difference

indicated reduced anxiety in the study group after the intervention.

Table (5): There was highly statistically significant difference in fatigue level among the studied patients in both groups (P<0.001).

From **table 6,** a highly statistically significant (P-0.001) decrease in fatigue score with a statistically significant difference was observed among the studied patients in both groups post- nurses-led interventions.

Table (1): Frequency and percentage distribution of the studied patients in both groups regarding their demographic characteristics (n=100)

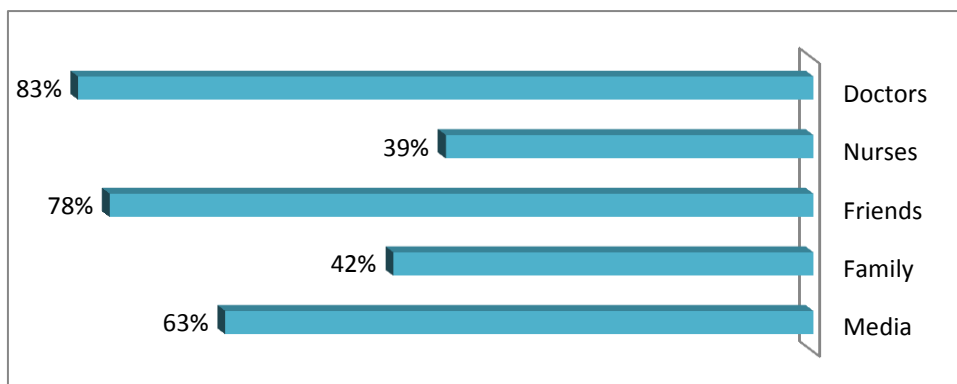| Item	Study group (50)		Control group (50)		$X^2(P)$
	No.	%	No	%	
Age in years					
21≤ 40 years	14	28	13	26	0.514
40 ≤ 60 years	36	72	37	74	(0.642)
Gender					
Male	29	58	28	56	0.613
Female	21	42	22	44	(0.745)
Educational level					
Read and write	8	16.0	2	4	0.743
Secondary	22	44.0	33	66	(0.843)
Higher	20	40.0	15	30	
Residence					
- Rural	19	38	15	30	0.713
- Urban	31	62	35	70	(0.933)

P>0.05, no statistically significant difference

Figure (1): Percentage distribution of the studied patients about their source of knowledge regarding cardiac catheterization

Table (2): Frequency and percentage distribution of the studied patients' knowledge undergoing cardiac catheterization in both groups

Items of knowledge	No =(100)		χ^2	P-value
	Study group (50) (N/%)	Control group (50) (N/%)		
Meaning of cardiac catheterization	47 (94)	12 (24)	94.07	<0.001*
Indications for cardiac catheterization	45 (90)	17 (34)	98.21	<0.001*
Complications of cardiac catheterization	48 (96)	18 (36)	106.94	<0.001*
Post care of catheterization	48 (96)	17 (34)	56.34	<0.001*
Questions related to cardiac catheterization	47 (94)	19 (38)	66.24	<0.001*
Follow-up and home care	44(88)	16 (34)	73.53	<0.001*

*highly significance at 0.001 levels

Table (3): Frequency and percentage distribution of total knowledge level of the studied patients undergoing cardiac catheterization in both groups

Total knowledge	Study group (50)		Control group (50)		T	P-value
	No	%	No	%		
Satisfactory	46	92	11	22	5.043	<0.001*
Unsatisfactory	4	8	39	78		

P<0.001, very highly statistically significant difference

Table (4): Comparison Mean and Standard Deviation of Anxiety Score in the Study and Control Groups

Total knowledge	Study group (50)	Control group (50)	T-test	P-value
Pre-intervention	66.63± 2. 35	65.67± 4.23	0.64	0.789 NS
Post-intervention	37.43± 3. 05	69.47± 3.22	15.049	<0.001*

P>0.05, no statistically significant difference
P<0.001, very highly statistically significant difference

Table (5): Frequency and percentage distribution of fatigue level of the studied patients in both groups (n=100)

Fatigue level	Study group (50)		Control group (50)		χ^2	P-value
	No	%	No	%		
No fatigue (0)	5	10	0	0.0	16.024	<0.001*
Very little (1-9)	12	24	0	0.0		
Mild (10-30)	18	36	0	0.0		
Moderate (3- 60)	15	30	22	44		
Severe (61-80)	0	0.0	15	30		
Worst (81-100)	0	0.0	13	26		

P<0.001, very highly statistically significant difference

Table (6): Differences between patients' fatigue mean scores in both groups (n=100)

Items	Study group (50)	Control group (50)	P- value
Fatigue score	14.03±1. 35	27.67±4.03	0.125 (0.001*)

P<0.001, very highly statistically significant difference

Discussion:

Nurses are the primary health care providers, and they play an important role in the management of patients undergoing cardiac catheterization by cooperating with patients and other health care professionals to develop the patient's treatment plan. Nursing interventions in cardiac catheterization management include seven components of care, beginning with early recognition of the disease and ending with the implementation of all practices in its management and prevention of consequences. Hence, the researchers were aimed to evaluate the effect of the nurse-led intervention on anxiety and fatigue among patients undergoing cardiac catheterization**.**

Results of the present study indicated that the highest percentage of the patients had satisfactory knowledge regarding cardiac catheterization in all items post-nurses-led interventions in the study group compared to the control group. This is reflected the effectiveness of nurse-led interventions on patients' knowledge. This is confirmed the need of the patients to nurses led interventions that improve their knowledge about cardiac catheterization.

Results of the present study highlighted that there was an improvement and significant difference in the studied patient's knowledge in the study group compared to the control group. From the researchers' point of view, this result reflects the positive effect of nurses-led interventions, which meet the patients' needs and provide them with sufficient knowledge to reduce their anxiety and fatigue. This improvement is the emphasis on the fact that most patients have a strong desire to learn more knowledge about their conditions.

Hypothesis one was supported by the study findings, as it was discovered that there was a highly significant difference between the two groups post-intervention, which reflected

the researcher's role as a nursing educator, which serves as an ongoing reference and it's possible that changes in practice based on the intervention. This result is supported by **Shaban, Mohamed, Abd El-Bary, & Ali, (2019)** who conducted a study about "Effect of Educational Program about Care of Patients Connected to Extracorporeal Membrane Oxygenation on Nurses Knowledge and Practices" and they reported that once the educational program was implemented, the participants' total knowledge scores improved.

The findings of the current research showed that there was a statistically significant difference between the control and study groups in terms of the mean anxiety score after the intervention. From the researchers' point of view, it reflected the good impact of the post-nurse-led interventions on reducing anxiety**.** These are confirmed the significant modifications in the patients' anxiety level that reflected the main goals of the implementation of nurses-led interventions.

These results are in the same line with **Zakerimoghadam, Shaban, , Mehran, & Hashemi, (2018)** who studied "Effect of muscle relaxation on the anxiety of patients was undergoing cardiac catheterization" for 140 patients. Results revealed that there was a statistically significant difference between the experimental and control groups (P < .001).

These results are supported by **Navvabi, Derakhshan, Sharif, Amirghofran, & Tabatabaei, (2019)** who examined the Impacts of teaching on the anxiety level of patients who have undergone coronary artery bypass graft in Shiraz and found that the level of anxiety in the experimental group declined after the intervention.

Guo, East, & Arthur (2018) also, studied the impact of a preoperative educational intervention on reducing anxiety and increasing recovery in Chinese cardiac patients. Their findings are consistent with the current study's findings, with a significant difference between the experimental and control groups. This study found that preoperative training, in combination with other preoperative treatments, can help patients feel less anxious.

Other studies were conducted by **Varaei, Keshavarz, Nikbakhtnasrabadi, Shamsizadeh, & Kazemnejad, (2016)** who did a study about "The effect of orientation tour with angiography procedure on anxiety and satisfaction of patients undergoing coronary angiography. **Brand, Munroe, & Gavin, (2015)** who performed a study "The effect of hand massage on preoperative anxiety in ambulatory surgery patients" and **Momeni, Salehi, & Seraji, (2017)** all results of their studies indicated the positive effects of using anxiety-reducing nonpharmacological methods on the patients' anxiety level. Thus, this finding was in line with this study.

Asilioglu and Celik, (2014) on the other hand, found contradictory results in their study of "The effect of preoperative education on anxiety of open cardiac surgery patients," the finding showed that the anxiety level in the experimental group did not differ significantly from the control group after training (P >.05). Ineffective communication among members of the care team, improper physical conditions of the patients' rooms, and participants' relationships with other patients who had undergone surgery, and the time the researcher chose to perform the training were all factors in their findings.

The results of the present study revealed that a statistically significant decrease in fatigue mean score was observed among the studied patients post- nurse-led interventions with highly statistically significant difference was observed among the studied patients in both groups. These results were supported with the aim and hypotheses of the present study. The researchers' point of view reflected the success of implementing the nurses-led interventions which lead to anxiety and fatigue-reducing.

This confirms that providing appropriate nurses-led interventions for the patients about health services could increase their ability to cope effectively with the many ongoing stressors they face. These results are supported by **Siu et al., (2016)** who conducted a study about "Screening for depression in adults" and found the same.

Conclusions:

Based on the results and hypotheses of the present study, the study findings concluded that the results support the research hypothesis in which implementing nurse-led intervention had highly statistical significant positive effect on reducing anxiety and fatigue level among the studied patients undergoing cardiac catheterization in study group. Also, it had highly significant positive effect on improving their knowledge level than control group (P=0.001).

Recommendations:

Based on the current study results, the following recommendations are proposed:

- The nurses-led intervention regarding cardiac catheterization should be conducted, discussed, integrated into the rehabilitation programs, and taught to patients using the booklet and illustrated pamphlets for each one to improve their information and reduce their anxiety and fatigue level

- Replication of the study on a large sample of patients undergoing cardiac catheterization in different settings is required for generalizing the results

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