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Effect of Nursing Guidelines on the Severity of Frozen Shoulder among Patient with Artificial Implanted Pacemaker

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Abstract: Background: Cardiac implanted pacemaker technique and therapies play an essential role in the treatment of some clinical heart disease. These disorders include bradyarrhythmias resulting from dysfunction of the sinus node or the atrioventricular node; implantable pacemakers consider as a life-sustaining devices that can return patients to a normal quality of life. Shoulder pain and disability in the first year after implant one of the complications can occur with implanted pacemaker. ***Aim***: The aim of the study was to assess the effect of nursing guidelines on the severity of frozen shoulder among patient with artificial implanted pacemaker, through measuring: 1.The knowledge of patient with artificial implanted pacemaker pre and post implant. 2. The visual analog scale for pain before and after the implant. 3. The disabilities of arm shoulder and hand before and after the implant. ***Design:*** A quasi-experimental research design with two groups (control and study) was used to conduct this study. ***Setting:*** The study was conducted at outpatient of coronary care unit at EL-Hussein University Hospital. ***Subject:*** A purposive sample: The sample size calculated by using Open Ebi version 3. It indicated the sample size was 60 adults patients based on comparing 2 means- 30 for control group and 30 for study group**.** ***Tools:*** Four tools were utilized to collect data in the current study. 1. Patient demographic characteristics 2. Interview questionnaire to assess patients' knowledge (pre-post) 3. A visual analog scale for pain assessment and 4. DASH (disabilities of the arm, shoulder and hand) tool) it was standardizes. ***Results:*** high significant positive difference between pre and post test which reveals improvement in both groups knowledge regarding pacemaker implantation, indication, complication, and follow up at p-value 0.000**. Also study indicates that, an improvement in the measurements of all visual analog scale in both groups but there is a significant improvement in study group which return to mild level of pain at 6 month measurement while the control group still in high moderate level of pain and an improvement in the measurements of all DASH scale in both groups but there is a significant improvement in study group at 6 month measurement with a maximum score 8 /30 which indicate minimum disability. ***Conclusion:*** The findings of this study concluded that, there is the frozen shoulder and arm discomfort was improved after implementing arm exercise, so practicing simple educational technique can prevent many of complications can occur to patient with implanted pacemaker**.** ***Recommendations*** Based on the results of the current study the following recommendations are suggested; 1. Designing educational guidelines for nurses, patient and their family about arm exercise and 2. Recommended continuous education for such patient in outpatient clinic

Keywords: Arm exercise, artificial implanted pacemaker, frozen shoulder.

INTRODUCTION

Cardiac implanted pacemaker technique and therapies play an essential role in the treatment of some clinical heart disease. These disorders include bradyarrhythmias resulting from dysfunction of the sinus node or the atrioventricular node; implantable pacemakers consider as a life-sustaining devices that can return patients to a normal quality of life. The branch of implantable cardiac rhythm management devices (CRMDs) has expanded rapidly over recent years. It is calculable that every year one and quarter million permanent pacemakers are implanted worldwide. In 2016, approximately 500,000 permanent pacemakers were implanted in Europe and there were 37,466 implants in Spain **(Wilkoff, et al, 2018)**. Due to the miniaturization and rapid evolution of technology, CRMDs are currently mostly implanted subcutaneously in the subclavicular fossa using transvenous leads. The shift from epicardial systems to transvenous systems inserted into a subcutaneous pocket has been accompanied by a concomitant shortening of procedure time and decrease in the complication rates. However, while technology has progressed rapidly and CRMDs have been shown to improve outcomes, other problems remain that can negatively impact quality of life in these patients **(Gold, et al, 2017, & Valentin, Ivo & Jekova, 2014)**

There are some perioperative complications can occur during vascular access including; pneumothorax, arterial puncture, and nerve plexus injury and also perforation, tricuspid valve damage, and sustained arrhythmias may occur during lead fixation in the myocardial wall. Postoperative and long-term complications requiring prevention maintenance and surgical spots include; infections, lead malfunction due to over sensing or mechanical failure, technical device failure, and discomfort with the device system **(Gadler, et al, 2015).**

Also shoulder pain and disability in the first year after implant one of the complications can occur with implanted pacemaker, a condition that can be incapacitating to affected individuals. The accumulated incidence of painful shoulder was 18.71%, in one study, which prospectively followed 50 patients after pacemaker implantation; shoulder-related problems were reported in at least 60% of patients 3 months after the procedure. This report, suggests that this complication is common. Yet, scant data exist regarding its frequency in patients undergoing implants. Furthermore,

preventive and therapeutic strategies have not been studied or reported **(James, et al, 2011)**

As such, after caring for several patients with post implant shoulder pain and disability, the researchers sought to develop a strategy to prevent this problem. Therefore, the researcher designed a randomized, controlled study to assess any benefit that a self-directed physical therapy program, geared toward minimizing shoulder band muscle stiffness or weakness, may be play important role in preventing postoperative shoulder pain in patients undergoing pacemaker implantation. The shoulder pain, comfort and disability ipsilateral to the implant site are a common complication of pacemaker cardiac rhythm device implantation.

The main nursing role after pacemaker; regularly assess patient condition, as well as monitoring blood pressure, heart rhythm and checking incision site for any bleeding or swelling. The nurses will encourage getting back on the feet again, and helping to build confidence for the patient. Be careful not to put too much pressure on the arm nearest the pacemaker site (usually the left arm), or to lift that arm up too far. Use best way to sit up, and how far can move the arm, this helps to prevent the pacemaker leads moving before they settle into the heart's tissue. (This moving of leads is called lead displacement). It is important to follow the same advice for a while when you get home **(British Heart Foundation (BHF), 2014)**

The patient care consider is a main an essential part on prevention of many complications can occur with pacemaker, the nurse must be assess knowledge and understanding regarding to procedure, clarifying and expanding on existing knowledge as needed. Explaining and clarifying knowledge, essential information, and conveying emotional support to reduce anxiety and fear and help the client to develop a realistic outlook regarding pacemaker procedure and therapy. Teach and educate range-of-motion (ROM) exercises for the affected side. ROM exercises of the affected arm and shoulder prevent stiffness and impaired function following pacemaker insertion as well as position for comfort, minimize non essential movement of the affected arm and shoulder during the initial postoperative period. Also restricting movement minimizes discomfort on the operative side and allows the leads to become anchored, reducing the risk of dislodging. Help the patient to perform gentle ROM exercises at least three times daily, beginning 24 hours after pacemaker implantation. ROM exercises facilitate restore traditional shoulder movement and forestall contractures on the affected aspect. Monitor pacemaker function with cardiac monitoring or intermittent ECGs **(Reynolds, et. al, 2016)**

Operational definition:

- **Frozen shoulder** :

Is one of the common pacemaker implantation's complication which involve Pain and disabilities of the shoulder at site of implantation.

Aim of the study:

The aim of the study was to assess the effect of nursing guidelines on the severity of frozen shoulder among patient with artificial implanted pacemaker, through measuring:

1- The knowledge of patient with artificial implanted pacemaker pre and post implant
2- The visual analog scale for pain before and after the implant
3- The disabilities of arm, shoulder and hand before and after the implant

Research hypothesis

The current study hypothesized that : Implementation of simple exercise protocol will affect positively on preventing frozen shoulder complication after artificial implantation of pacemaker.

SUBJECTS AND METHODS

Research design:

A quasi-experimental research design with two groups (control and study) was used to conduct this study.

Setting:

The study was conducted at outpatient of coronary care unit at EL-Hussein University Hospital.

Subjects:

A purposive sample: The sample size calculated by using Open Ebi version 3. It indicated the sample size was 60 adults patients based on comparing 2 means- 30 for control group and 30 for study group. A power 80%, the subjects were Patients undergoing pacemaker implantation at coronary care unit at EL-Hussein University Hospital. Who were to be followed at the outpatient cardiac clinic at hospital were eligible for screening. From both genders with different educational levels, and agreed to participate in the study.

Exclusion criteria included:

1. Prior shoulder injury or surgery
2. Ipsilateral mastectomy
3. Cerebrovascular accident with ipsilateral arm involvement
4. Inability or refusal to perform exercises as prescribed or to attend follow-up visits, or
5. Refusal to provide informed consent.

Tools for data collection:

Four tools were utilized to collect data in the current study. Two tools were developed by the researchers (patient demographic characteristics, interview questionnaire to assess patients' knowledge (pre-post). Physical examination and disability questionnaires (A visual analog scale for pain assessment, and DASH (disabilities of the arm, shoulder and hand) tool) it was standardizes.

1. Patient Demographic Characteristics:

Designed by the researchers' in Arabic language after reviewing the related literature. The items on this sheet were adapted from **Wilkoff, et al, (20018), and Gold, et al, (2017).** It consisted of demographic characteristics of patients under study such as age, gender, history of chronic diseases, diagnosis, and educational level

2. Interview questionnaire: to assess patient knowledge (pre/post):

This questionnaire was developed by the researchers in an Arabic language, and filled by the patients in the presence of the researchers'. Based on the review of related literatures

from **Gold, et al, (2017) & Burke, et al, (2013),** to assess patients' knowledge regarding pacemaker implementation and its complications, it included 20 questions (MCQ and true and false questions) about (indications, types, complications, signs and symptoms of malfunction and follow-up)

Scoring system:

The assessment of patients' knowledge consisted of 20 multiple choices, true and false questions. The correct answer was given (1 grade), the incorrect answer was given (zero), the total grades for the interview questionnaire was (20 grades), and the satisfactory level was ≥ 60%.

3. Visual analog scale (VAS) for pain

This tool was used to measure of pain intensity condition before implantation and after the implantation by 1, 3, and 6 months. The pain VAS originated from continuous visual analog scales developed by **Woodforde and Merskey, (1972).** The pain VAS is a single-item scale. The pain VAS is self-completed by the respondent. The respondent is asked to place a line perpendicular to the VAS line at the point that represents their pain intensity.

Scoring system:

Using a ruler, the score is determined by measuring the distance (mm) on the 10-cm line between the "no pain" anchor and the patient's mark, providing a range of scores from 0–100.

Score interpretation.

A higher score indicates greater pain intensity. Based on the distribution of pain VAS scores in postsurgical patients World Health Organization delineate their surgical pain intensity as none, mild, moderate, or severe, the following cut points on the pain VAS have been recommended: no pain (0–4 mm), mild pain (5–44 mm), moderate pain (45–74 mm), and severe pain (75– 100 mm) .

4. DASH (disabilities of the arm, shoulder and hand) questionnaire:

This tool was used to assess patients' symptoms as well as ability to perform certain activities before implantation and after the implantation by 1, 3, and 6 months. It was adopted from **Beton, et al, (2005).** It consists of two components: the disability/symptom questions (30 items) and the optional high performance (4 items).

Scoring system:

The DASH is scored in 2 components: the disability/symptom queries (30 things, scored 1-5) and the optional high performance (4 items, scored 1-5). At least twenty seven of the thirty things should be completed for a score to be calculated. The allotted values for all completed responses square measure merely summed and averaged, producing a score out of five. This value is then transformed to score out 100 by the following formula

$$DASH = \frac{[(\text{sum of n responses})-1] \times 25}{N \text{ (the number of completed responses)}}$$

A higher score indicates great disability.

TOOLS VALIDITY AND RELIABILITY

- The tools were developed by the researchers (1&2). It was revised by a panel of 5 experts in the field of Medical-Surgical nursing to evaluate its face and content validity. The experts reviewed the tools for its content, clarity, simplicity, relevance, comprehensiveness, appropriateness, and for tools applicability. Minor modifications were done and so the ultimate sorts of the tools were developed.
- Testing of the reliability of the proposed data collecting tools was done with the alpha Cronbach test which was 0.84 for the demographic characteristics tool, and 0.72 for the knowledge assessment tool.

PILOT STUDY

A pilot study was carried out on 5 randomly selected patients to test the applicability of the study and to test clarity and applicability of the designed questionnaires, as well as to estimate the time needed for each tool, modifications were done for the used tools then the final form was developed. Patients of the pilot study were included in the study's subjects.

FIELD WORK AND PROCEDURE

Ethical considerations:

The research approval was obtained from the director of EL-Hussein University Hospitals to conduct the study in their facilities before the study. The researchers clarified the purpose and aim of the study to patients included in the study. Oral consent was obtained from patients to ensure willingness to engage in the study. The researcher maintained of patients anonymity and confidentiality of subjects' data will be secured. Patients were informed that they could withdraw from the study at any time without penalty.

Procedure:

The procedure enclosed 3 sections: preceding or preparatory phase, implementation phase and evaluation phase.

The Preparatory phase:

The preparatory phase includes two essential phase's assessment and planning:

1. Assessment phase; the researchers interviewed with patients included in the study before the procedure to explain aim of the study and take their approval to participate in the study, then the basic assessment was done and data was collected.

2. Planning phase; involved extensive reviewing of the recent related literature to develop tools for data collection and prepare simplified leaflets related to instructed exercise. It contained many pictures, and some words to assist patients in understanding and for it to be accessible at home. The researchers developed it in the Arabic language. The exercises were chosen based on simplicity and on its effectiveness to prevent complications.

The content validity was revised by a group of five experts in the field of Medical-Surgical Nursing to determine the

included items are clear and suitable to achieve the aim of the study, and the final modifications were done based on the opinions of the experts

The implementation phase:

The interview questionnaire was distributed to the patients (both groups) to answer it by themselves in the presence of the researcher in order to assess patients' baseline knowledge regarding pacemaker. For the illiterate patients the questionnaire was filled out by the researchers'. It took 10 minutes to fill this questionnaire. Then the researcher filled out the VAS and The DASH for each patient one time before implantation of pacemaker and before implementation of the exercise.

The researcher attends to the outpatient clinic 3 times a week; from 9am till 12pm. The researcher met the patient at the Cardiac outpatient clinic and the patient was selected according the inclusion and exclusion criteria. The control group received standard of care instructions after implant, which included no lifting objects heavier than 2.5–4 kg and avoidance of raising the elbow above the shoulder level for 6 weeks post implant.

In the study group, during the 1-week post implant visit, patients were instructed individually on a series of specific exercises to be completed 3 days per week for 6 weeks. The exercises were developed by a physical therapist with extensive experience in the management of shoulder impingement syndrome **(Moseley, et al, 1992).** The exercises were demonstrated to each patient in the exercise group, and a handout with written instructions and pictures was given to each subject an exercise grid sheet was also provided to monitor compliance. Patients were asked to complete this grid after every session, and to return it to the study staff after the 6 weeks of exercise was completed. Data collection was conducted over a period of one year starting from September 2018 till the end of August 2019.

Evaluation phases:

VAS was analyzed for presence of new onset of shoulder pain or discomfort, as well as for total VAS score. Higher VAS scores equate to worse pain and less shoulder mobility. Subjects were also given the DASH (DASH stands for "disabilities of the arm, shoulder, and hand") questionnaire to complete. Follow-up visits for both groups occurred at 1, 3, and 6 months post implant and included the same physical examination as at baseline, the DASH questionnaire, and the VAS.

In addition, telephone calls for compliance verification were done for the exercise group at 2, 3, 5, and 6 weeks post implant. Telephone calls were also used to screen for potential complications that could require intervention, such as hematoma or wound problems. The primary endpoint was development of new onset shoulder pain or discomfort compared to baseline as reported on VAS. Secondary endpoints included the presence of a positive impingement test, and the difference in scored results of the VAS and DASH between groups at 1 and 6 months

STATISTICAL DESIGN

The collected data were analyzed using (SPSS) version 20. Qualitative data was presented as number and percent, paired sample t-test. Relations between different qualitative variables were tested using correlation coefficient (person correlation). Probability (p-value) ≤ 0.05 was considered significant and < 0.001 was considered highly significant. While, > 0.05 was considered non-significant

RESULTS

Table (1): Characteristics of the studied patients (n= 60)

Characteristics	Control group (n=30)	Study group (n=30)
Age (mean± SD)	59.6±8.8	56.5±6.6
Gender n (%)		
- Male	15 (50%)	13 (43.3%)
- Female	15 (50%)	17 (56.7%)
Educational Level n (%)		
- Illiterate	5 (16.7%)	7 (23.3%)
- Read and write	9 (30%)	5 (16.7%)
- Educated	16 (53.3%)	18 (60%)
Diagnosis n (%)		
- Depressed ejection fraction	23 (76.7%)	20 (66.7%)
- Heart block / bradycardia	5 (16.7%)	7 (23.3%)
- Syncope	1 (3.3%)	2 (6.7%)
- Ventricular tachycardia	1 (3.3%)	1 (3.3%)
Past medical history n (%)		
- Cardiac diseases	18 (60%)	24 (80%)
- Hypertension	16 (53.3%)	10 (33.4%)
- Diabetes	4 (13.4%)	1 (3.3%)
- Respiratory	5 (16.7%)	7 (23.3%)
- Hepatic	1 (3.3%)	0 (0%)
- Renal	0 (0%)	0 (0%)

Table 1 raveled that the mean age of control population was 59.6±8.8 while for study population was 56.5±6.6, regarding gender the population of control group is divided for both gender (50% male and 50% female) and for study group 56.7% was females, and regarding education of control group 53.3% was educated also regarding study group 60%

was educated. Also the table shows that 76.7% of control group has a depressed ejection fraction as a diagnosis and 66.7% of study group has the same diagnosis. As regarding past medical history 60% of control group has a cardiac disease while 80% of study group has a cardiac problems.

Table (2): Patients' satisfactory level of knowledge for both groups (n=60)

Items	Pre test				Post test				t-value	P- value
	Sat.		Un.		Sat.		Un.			
	No.	%	No.	%	No.	%	No.	%		
Control group Total knowledge sheet (n-30)	10	33.3%	20	66.7%	22	73.3%	8	26.7%		
Control group Total knowledge (n-30) mean ± SD	10.47±1.9				13.57±2.4				5.2	0.000**
Study group Total knowledge sheet (n-30)	11	36.7%	19	63.3%	25	83.3%	5	16.7%		
Study group Total knowledge (n-30) mean ± SD	10.57±1.9				14±2.4				8	0.000**

Significant at P ≤ 0.05.** *****Highly significant at P <0.001

This table represents high statistically significant positive difference between pre and post test in patient knowledge which reveals improvement in both groups knowledge regarding pacemaker implantation, indication, complications, and follow up.

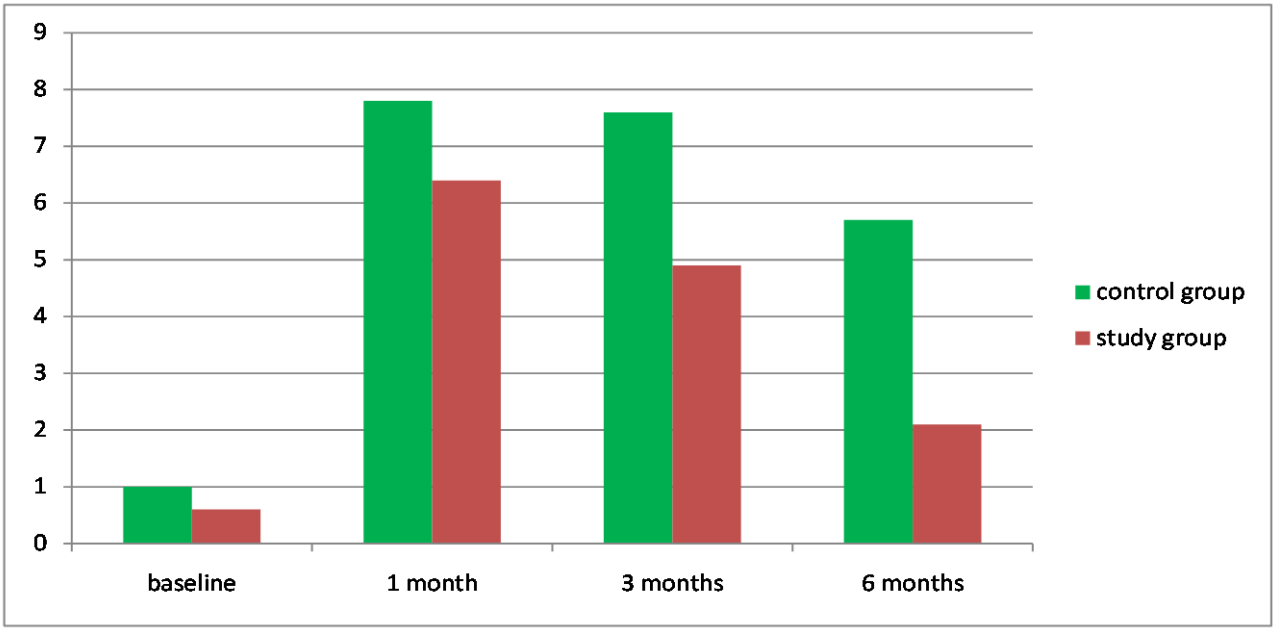

Figure (1): Patients' measurements of visual analog scale of pain (n=60)

Figure 1 represents that there was an improvement in the measurements of all visual analog scale in both control and study groups, but there is a statistically significant improvement in study group which return to mild level of pain at 6 month measurement while the control group still in high moderate level of pain.

Table (3): Visual analog scale of pain measurement for control and study groups (2 time measurements)

Measurement	1st month control	1st month study	t-value	P value
6th month control	23.8±16.4	---------	7.96	0.000**
6th month study	----------	44.1±8.2	29.37	0.000**

*****Highly significant at P <0.001***

Table 3 represents that there was a highly statistically significant improvement in the measurements of VAS measurement between 1st month and 6th month measurement in both control and study groups.

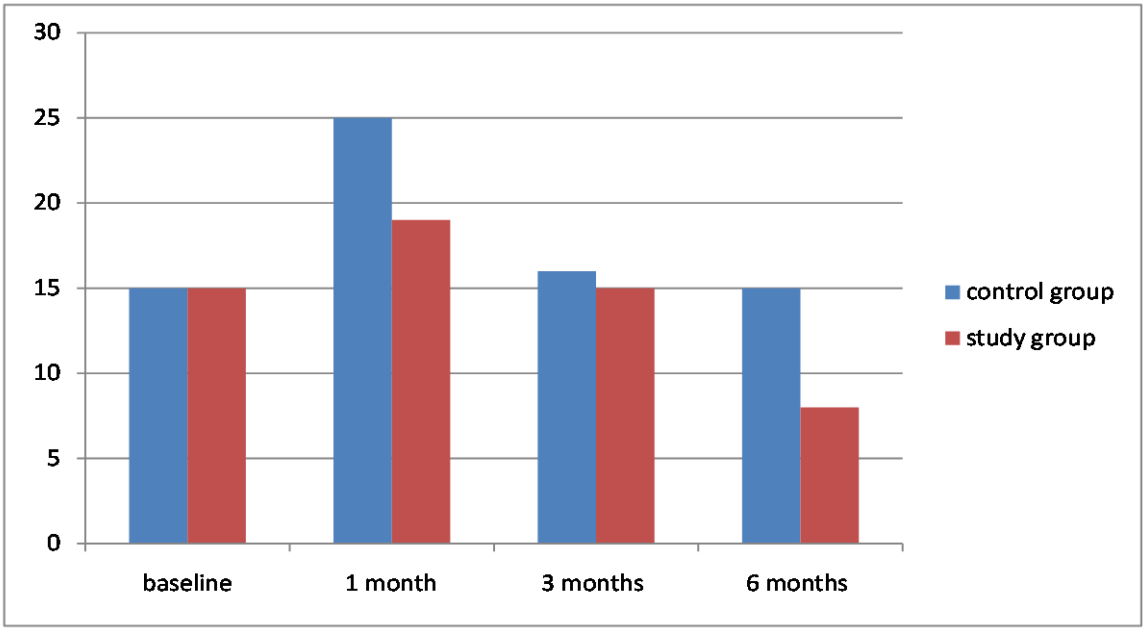

Figure (2): Patients' measurements of disabilities of arm, shoulder and hand (DASH) (n=60)

Figure 2 Shows that there was an improvement in the measurements of all DASH scale in both control and study groups but there is a statistically significant improvement in study group at 6 month measurement with a maximum score 8 /30 which indicate minimum disability.

Table (4): Disabilities of arm, shoulder and hand (DASH) measurement for both control and study groups (2 time measurements)

Measurement	1st month control	1st month study	t-value	P- value
6th month control	1.7±2.5	---------	3.63	0.001**
6th month study	----------	5.1±1.9	14.09	0.000**

***Highly significant at P <0.001*

Table 4 represents that there was a statistically significant improvement in the measurements of DASH measurement between 1st month and 6th month measurement regarding control group, while the is a highly statistically significant improvement in the study group.

DISCUSSION

A permanent pacemaker is indicated in patients with bradycardia, i.e. second- or third-degree atrioventricular block, significant sinus node dysfunction, tachycardia-bradycardia syndrome, bundle branch block with a history of syncope, and, in specific circumstances, in various disease states, according to guidelines. And also known as an electronic device that delivers direct stimulation to the heart, with the purpose of initiating and maintaining the heart rate when the heart's natural pacemaker is unable to do so Pacemakers initially were developed and remain the primary modality for maintaining an adequate ventricular heart rate in patient with life-threatening bradycardia and there are many complications can occur with pacemaker, so the aim of this study was to assess the effect of practicing arm exercise on prevention of frozen shoulder complication for patient with artificial implanted pacemaker, through measuring

Regarding sociodemographic characteristics, the current study refer to; the study sample older age group is a most common of the study and control group, this might be the older age people high risk for cardiac disorders than other younger age group this result in agreement with **Denis, et al, (2017)** who study Pacemaker implantation in elderly patients: safety of various regimens of anticoagulant therapy they are reported that the most common age group included in their study older people. And more than half of them were female of the study group while control group equally the same male and female, this finding in accordance with **Mohamed & Abd El-Lateef, Egypt, (2014)** in their study Impact of Nursing Teaching Protocol on reduction of Complications for Patient with Permanent Artificial Pacemaker they are stated that, the majority of their study were female, also the current finding supported by **Denis, et al, (2017)** their study refer to more than half of study sample were female.

Finding of the current study reflect that, the majority of the study and control group were educated, as well as **Frederik, et al, (2018)** who study that Patients with atrial fibrillation and permanent pacemaker: Temporal changes in patient characteristics and pharmacotherapy supported this result, based on finding on their study, they refer to the most of sample included in their study were educated. On opposite side this result in contradiction with **Mohamed & Abd El-Lateef, Egypt, (2014)** they reported that the most of their study subject of study and control group were illiterate. This contradiction may due to difference of sociodemographic characteristics between urban and rural.

Regarding to past history the current study founded that, more than half of them with cardiac diseases, this result in agreement with **Abd Elnaser, et al, Egypt, (2016)** on their study effectiveness of educational program on knowledge

and practice of patients undergoing permanent pacemaker their finding, the most of subject included in the research study had past history of cardiac disease. This might be the patients needed to implanted pacemaker actually have a cardiac problem as well as bradycardia, i.e. second- or third-degree atrioventricular block, significant sinus node dysfunction, tachycardia-bradycardia syndrome, bundle branch block with a history of syncope

Based on the finding of the current study regarding to total patient knowledge, patient satisfactory level increase post education than pre education this finding in accordance with **Abd Elnaser, et al, Egypt, (2016)** they reported that the patient knowledge was improved post education than pre education. In the same line this result supported by **Mohamed & Abd El-Lateef, Egypt, (2014)** As regards knowledge score levels among study and control groups, all patients were having an unsatisfactory knowledge level before intervention implementation while the control group receives routine hospital care. After intervention implementation, nearly all patients of study and control groups were having satisfactory and good knowledge levels. Also **Yossif & AbdEl-aal, Egypt, (2017)** on the study of Home Care for Patients with Permanent Pacemaker Insertion stated that, As regards total knowledge post program, the present study clarified that there were improvement of patients' total knowledge score post program to reach majority of studied patients compared by less than one fifth pre the program.

Concerning pain level, current study indicates that there was an improvement in the measurements of all visual analog scale in both groups but there is a statically significant improvement in study group which return to mild level of pain at 6 month measurement while the control group still in high moderate level of pain, this finding in agreement with **Peter & Per (2018)** on the study Living with a pacemaker: patient-reported outcome of a pacemaker system they are reported that, the patients had satisfactory level regarding to pain post pacemaker implantation, and **Daniels, et al, (2018)** who stated that on their study Preventing Shoulder Pain after Cardiac Rhythm Management Device Implantation: A Randomized, Control Study, The average VAS score was significantly better in the exercise group. In the same line **Park, et al (2014)** on the study of Effect of Shoulder Stabilization Exercise on Pain and Functional Recovery of Shoulder Impingement Syndrome Patients, represents that the results of comparison of the therapeutic effect in the experimental and control groups revealed significant differences in abduction, & VAS. In addition **Polaski, et al, (2019)** who study Exercise-indices hypoalesia: A meta-analysis of exercise dosing for the treatment of chronic pain, find that increasing the frequency of exercise sessions per week is most likely to have a positive effect on chronic pain patients.

Regarding to disability of arm, shoulder and hands, this study refer to improvement in the measurements of all DASH scale in both groups but there is a significant improvement in study group at 6 month measurement with a maximum score 8 /30 which indicate minimum disability, this result in accordance with **Peter & Per (2018)**, they stated that statistically improvement in patient arm function, movement and discomfort and **Daniels, et al, (2018)** who stated that results of DASH scores. The mean DASH score for the two groups at different time points were found to be significantly different ($P < 0.03$), benefiting the exercise group. **Saelim** & **Makarawate (2015)** on their study stated of follow up of shoulder exercise program for rehabilitative post pacemaker patients for a period of 3 months found that the experimental group showed degree range of motion of shoulder flexion, extension and abduction were significantly better than control group.

CONCLUSION & RECOMMENDATION

The findings of this study concluded that, there is the frozen shoulder and arm discomfort was improved after implementing arm exercise, so practicing simple educational technique can prevent many of complications can occur to patient with implanted pacemaker.

RECOMMENDATION

Based on the results of the current study the following recommendations are suggested:-

1. Designing an educational guidelines for nurses, patient and their family about arm exercise
2. Recommended continuous education for such patient in outpatient clinic

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