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Home Care for Patients with Permanent Pacemaker Insertion

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Abstract:
The aim: *of this study was to evaluate the home care program for patients with permanent pacemaker insertion.*
Design: *A quasi experimental design was used.*
Setting: *This study sample was selected from cardiology department in Benha University Hospital and National heart institute, Cairo, Egypt then followed by home visits to studied patients to conduct this study.*
Sample: *A purposive sample of all patients with newly permanent pacemaker insertion in Benha University Hospital were selected and the same numbers of patients were selected randomly from National Heart Institute (the total sample size was 40 patients).*
Tools: *Two tools were used for data collection I- An interviewing questionnaire designed to collect data about studied sample socio demographic characteristics, history of co-morbid diseases, knowledge about heart, pulse, artificial pacemakers and self-reported practices about pacemaker care. II- Observational checklist designed to evaluate studied sample home environment, and their practices regarding pacemaker care.*
Results: *The majority of studied participants had more than one health problems as cardiac diseases, hypertension, and diabetes, most of them had incorrect knowledge regarding heart, pulse, artificial pacemakers and unsatisfied total practices score preprogram. However, after the program implementation the majority of them had adequate total knowledge score. As well as most of them had satisfied total practices score after the program implementation.*
Conclusion: *This study concluded that, there were improvement post program in studied participants' knowledge regarding basic structure and function of the heart, pulse and artificial pacemaker with statistically significant differences regarding all knowledge items. Statistically significant differences were detected regarding all items of practices between before and after the program.*
Recommendations: *Continues of home care program to all patients with permanent pacemaker insertion to improve their knowledge and practice regarding permanent pacemaker.*
Keywords: *Pacemakers, Home car, Program*

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I. Introduction

Sudden death is one of the most common reasons of death worldwide which can be prevented by inserting a pacemaker. Studies have proved that 60 percent of all sudden cardiac deaths occur due to arrhythmia." Each year 1-2 million persons worldwide die because of lack of access to pacemakers [1].

Normally the heart produce its own electrical streams allowing it to beat at diverse rates according to the daily needs. There are specific conditions in which the heart may be incapable to adjust the rate causing a slow heart beat or may display blocks in the pathways through which the current flows (heart blocks). Usually, this trouble has been overcome via use up a small battery operated devices, known as artificial pacemakers which stimulate the heart [2]. Pacemaker is an electronic device that conduct electrical stimuli to the heart muscle. Pacemakers are commonly used when a cardiac patient has a permanent or temporary slower than normal impulse formation or a symptomatic A.V. or ventricular conduction problems. They may also be used to manipulate tackydysrhythmias that don't respond to drugs. Pacemaker technology may be used in coronary artery disease patients [3].

Although pacemaker can be accompanied with some complications. Immediate and precise control is effective in decreasing cardiac arrhythmias, and individual's rapid resume to the normal life. Teaching patients the essential points regarding to pacemaker management, can prevent the complications. Patients' education has become a vital part of the therapeutic approach to help cardiac patients with pacemakers [4]. Home health care is a particular area of nursing practice with its roots strongly placed in community health nursing. Home health care is that constituent of comprehensive health care whereby health services are offered to patients and families in their homes to promote, maintain, or restore health [5], [6]

II. Significance of the study

Permanent pacemaker can be lifesaving and preventing death. Optimal outcome after permanent pacemaker insertion can only be obtained if patients are supported in compliance to a lifelong with permanent pacemaker. Patients not have any knowledge about permanent pacemaker is one of the most serious problems facing healthcare today [7]. Patient with insertion of a permanent pacemaker device needs information regarding the device and its complications, and the related factors condition. Nurses play a crucial role in patient education which can positively affect proper device function and will increase commitment to the follow up treatment. Lastly, the nurses can provide psychological support, and focus on the immediate concern of the patient and help them adapt successfully with their new life situation [8], [9].

III. Aim of the study

This study aimed to evaluate the effect of home care program for patients with permanent pacemaker insertion through:

- Assessing the patients' knowledge and practices about permanent pacemaker.
- Designing and implementing home care program for patients with permanent pacemaker insertion according to their needs.
- Evaluating the degree of improvement in patients' knowledge and practice about permanent pacemaker.

Research hypothesis:

The patients with permanent pacemaker insertion who undergoing the home care program their knowledge and practices regarding their pacemaker will be improved.

IV. Subjects and Methods

Research design: A quasi experimental design was utilized

Setting: This study was conducted at Benha University Hospital and National Heart Institute, Cairo, Egypt (cardiology department to get studied patients addresses) then followed by visiting the studied patients' home to carry out the study.

Sample: All patients with newly permanent pacemaker insertion in Benha University Hospital were selected through six months (the total number was 20 patients) and the same numbers of patients were selected randomly from National heart institute, Cairo, Egypt, to collect data (the total sample size was 40 patients).

Tools: Two tools were used for data collection

Tool I- An interviewing questionnaire that was developed by the researchers in Arabic language after reviewing of related literature [10], [11], [12], [13], which consisted of three parts:

First part:

A. To assess socio - demographic characteristics of patients with permanent pacemaker insertion. It compromise items about age, sex, marital status, educational level, occupation and income.

B. To assess co-morbid diseases which included cardiac diseases, hypertension, diabetes and kidney diseases.

Second part: To assess patients' knowledge about permanent pacemaker, which covered three main areas, the heart (basic structure of the heart and basic function of the heart), the pulse (normal rate, sites of measuring pulse and measurement technique), and artificial pacemaker (meaning, indications, types, how the pacemaker works, pacemaker's battery replacement, expected complications, preventive measures of expected complications, medications, signs of pacemaker malfunction and importance of medical follow up.

Patients' knowledge scoring system: For knowledge items the correct answers were predetermined according to literature review, a correct answer was scored 2, the correct and incomplete was scored 1 and the incorrect answer was scored zero. The total knowledge scores were considered adequate if the score of the total knowledge $\geq$ 60 % and considered inadequate if it is less than 60%.

Third part: To assess patients' practices about pacemaker care through asking questions such as activity restrictions for 2 months after surgery, avoid use certain electrical devices over the pace-maker site, avoid positions that cause pressure on the site, notify all care providers of the pacemaker, carry the pacemaker identification card at all times, and regular follow up care with the physician as recommended.

Tool II- Observational checklist designed to evaluate

A. Observing and assessing the patient's practices regarding precaution of artificial pacemakers such as pacemaker incision care, measure the pulse rate, avoid tight- fitting clothing over the pacemaker site and wear a medic alert bracelet or tag.

Patients' practices scoring system: For each practice item a done response was scored 1, and not done was scored zero. The total patients' practices scores was considered satisfactory if the score of the total practice ≥ 60 % and considered unsatisfactory if it is less than 60%.

B. To assess the patient's home environment such as (presence of magnetic field, ventilation, sanitary water supply, sewage disposal and the bathroom cleanness).

Home environment scoring system

Each item was considered good if > 75 % considered average if it is equals 50-75% and considered poor if it is less than 50%

Content validity

The tools were reviewed for comprehensiveness, appropriateness, and legibility by an expert panel consisting of five Community Health Nursing experts. The panel ascertained the face and content validity of the tools.

Ethical consideration

Permission was obtained orally from each patient before conducting the interview and after giving a brief orientation to the purpose of the study. The patients were also reassured that all information gathered would be created confidentially and used only for the purpose of the study. They were also informed about their right to withdraw at any time from the study without giving any reasons.

Pilot study

A pilot study was carried out on 10% from total sample of the patients to assess the clarity, visibility, and time required to fulfill the tools. Those patients in the pilot study were included in the main study sample since no modifications were done.

Field of Work:

- A written official letter was obtained from the Dean of the Faculty of Nursing, Benha University and delivered to the directors of selected setting in order to obtain their approval for conducting of the research after explaining its purpose.
- A verbal agreement was taken from every patient in the study after explanation of the study purpose.
- The study was carried out through four phases: preparation, planning, implementation, and evaluation. These phases were carried out from beginning of December 2016 to the end of May 2017.
- The previous mentioned setting was visited by the researchers three days/week (Saturday, Sunday and Thursday) from 9.00 am to 4.00 pm. The tools took about 30-45 minutes. Data collection took about six months.
- The researchers met the patients in the previous mention setting then followed by home visit to implement the program.

Home care program

Preparation Phase:

Based on the results obtained from the interviewing questionnaire and observational checklists, as well as literature review, the home care program was developed by the researchers. It was implemented immediately after the pre- test.

General objective: Application of home care program for patients with permanent pacemaker insertion will improve their knowledge and practices regarding pacemaker.

Contents of home health care program: The content of the program was designed to meet patients' needs. Its contents were:

- Basic structure of the heart
- Basic function of the heart
- The normal pulse rate
- Sites of measuring pulse
- Measurement pulse technique

Pacemaker information

- Meaning
- Indication
- Types
- How the pacemaker works
- Battery replacement

- Expected complications
- Preventive measures of expected complications
- Medications
- Signs of pacemaker malfunction
- Importance of medical follow up

Precaution of artificial pacemakers (practices)

- Incision care technique
- Measure the pulse rate
- Activity restrictions
- Avoid use certain electrical devices over the pace-maker site
- Avoid positions that cause pressure on the site
- Notify all care providers of the pacemaker,
- Carry the identification card of pacemaker at all times
- Regular follow up care with the physician as recommended

Planning and implementation phase

The number of sessions was 6 sessions (4 sessions for theoretical and 3 sessions for practical). The duration of each session was 30-45 hours. Each session started by a summary about what had been given through the previous session then the objectives of the new topics. Teaching methods were used a discussion, demonstration and re-demonstration, with suitable teaching aids were specially prepared for the program, as follows: Booklets, pictures and handouts.

Evaluation phase

Evaluation of the program was done by using the post-test questionnaire which was the same formats of pre- test in order to compare the change in the patients' knowledge and practices immediately after implementation of the program to assess gained knowledge and acquired practices.

Statistical analysis

Data were verified prior to computerized entry. The Statistical Package for Social Sciences (SPSS version 20.0) was used for that purpose, followed by data analysis and tabulation. Descriptive statistics were applied (e.g., mean, standard deviation, frequency and percentages). Test of significance (chi-square) Pearson correlation coefficients were used. A statistically significant difference was considered at p-value $p \leq 0.05$, and a highly statistically significant difference was considered at p-value $p \leq 0.001$.

V. Results

Table (1): Showed that 35.5% of studied participants aged more than 60 years with mean ±SD 65.7±5.7, 45% had secondary education, 52.5% married, 62.5% didn't work and 45.0% hadn't sufficient income

Figure (1): Displayed that 57.5% of studied participants were male and 42.5% were female

Figure (2): Illustrated that 37.5% had cardiac disease, 60.0% had diabetes, 22.5% had hypertension and only 5.0% had kidney diseases.

According to the research hypothesis: The findings revealed that there were significant improving in studied patients' knowledge and practices regarding pacemaker device insertion after implementation of home care program (table 2, 3, and 4, figure 3, and 4)

Table (2): Displayed that there were improvement post program in studied sample knowledge regarding basic structure and function of the heart, pulse, artificial pacemaker, medications, signs of pacemaker malfunction, and importance of medical follow up with statistically significant differences regarding all knowledge items

Figure (3): Showed that there was improvement of patient's total knowledge post program to reach 88.2% compared by 12.7% pre the program

Table (3): Showed that there were statistically significant differences in all studied participants' practices as self-reported regarding pacemaker precaution between pre and post program.

Table (4): Revealed that there were statistically significant differences in all studied participants practices regarding pacemaker incision care, measuring pulse, avoiding tight clothing and wearing medic bracelet between pre and post program.

Figure (4): Illustrated that there was improvement of patient's total practices post program to reach 93.6% compared by 38.3% pre the program

Table (5): Clarified that there was a positive highly statistically significant correlation between studied participants' total knowledge score and their total practices score

Table (6): Showed that most of studied participants had good score in all items regarding home environment; except for magnetic field inside their house which they had poor score.

Table 1. Distribution of studied participants regarding socio- demographic characteristics.

Socio- demographic characteristics items	**No**	**%**
Age		
30-	6	15.0
40-	8	20.0
50-	11	27.5
60+	15	37.5
Mean ± SD 65.72±5.74		
Education level		
Illiterate/ Read and write	5	12.5
Basic education	7	17.5
Secondary education	18	45.0
High educated	10	37.5
Marital status		
Single	2	5.0
Married	21	52.5
Widow	12	30.0
Divorced	3	7.5
Occupation		
Working	15	37.5
Not working	25	62.5
Income		
Sufficient and saves	7	17.5
Sufficient	15	37.5
Insufficient	18	45.0

Figure (1): Distribution of studied participants regarding to their sex

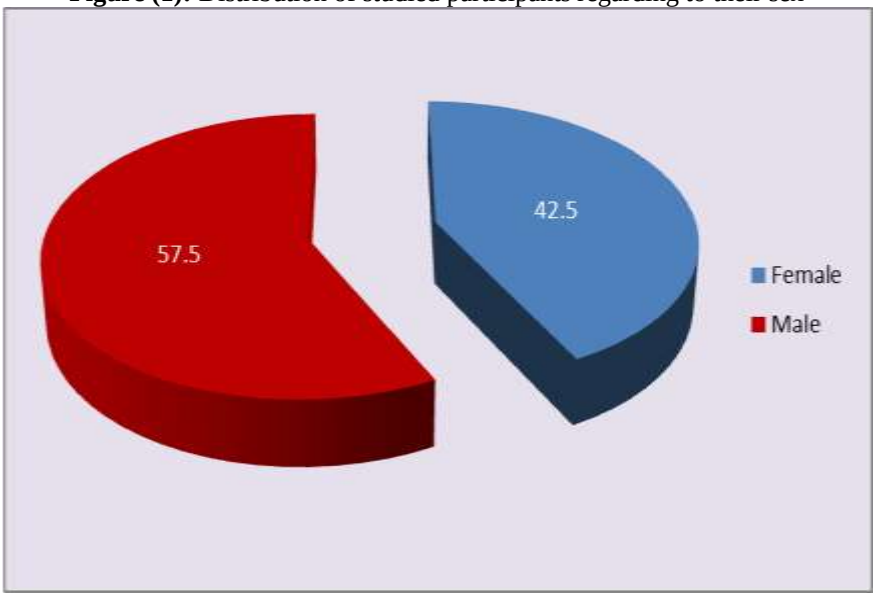
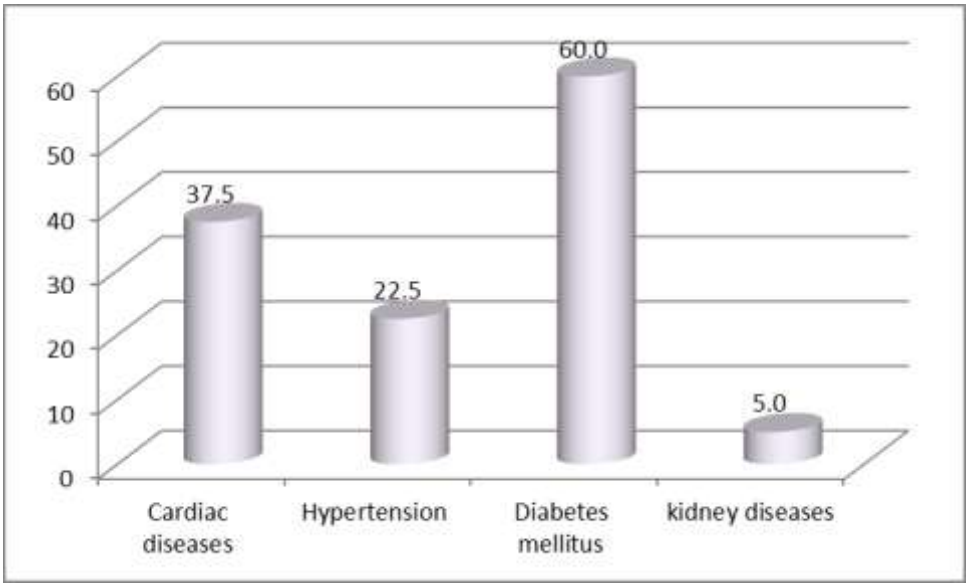


Figure (2): Distribution of studied participants regarding history of co-morbid diseases (n=40)



***the results wasn't mutually exclusive**

Table (2): Distribution of studied participants' knowledge regarding to heart and artificial pacemakers pre and post program implementation

Knowledge items	Pre program						Post program						X^2	p
	Correct		Correct and incomplete		Incorrect		Correct		Correct and incomplete		Incorrect			
	No	%	No	%	No	%	No	%	No	%	No	%		
The heart														
Basic structure of the heart	2	5.0	7	17.5	31	77.5	18	45.0	12	30.0	10	25.0	23.2	0.000
Basic function of the heart	2	5.0	12	30.0	26	65.0	22	55.0	10	25.0	8	20.0	18.6	0.000
The pulse														
*Normal rate	5	12.5	0	0.0	35	87.5	38	95.0	0	0.0	2	5.0	65.4	0.000
Sites of measuring pulse	0	0.0	40	100.0	0	0.0	15	37.5	35	87.5	0	0.0	98.7	0.000
Measurement technique	0	0.0	2	5.0	38	95.5	30	75.0	7	17.5	3	7.5	84.5	0.000
Artificial pacemakers														
Meaning of pacemaker	0	0.0	0	0.0	40	100.0	22	55.0	10	25.0	8	20.0	93.7	0.000
Indications	0	0.0	5	12.5	35	87.5	26	65.0	12	30.0	2	5.0	75.6	0.000
Types	0	0.0	3	7.5	37	92.5	14	35.0	16	40.0	10	25.0	43.4	0.000
How the pacemaker works	0	0.0	6	15.0	34	85.0	36	90.0	2	5.0	2	5.0	58.4	0.000
Pacemaker's battery replacement.	2	2.0	35	87.5	3	7.5	35	87.5	5	12.5	0	0.0	95.1	0.000
Expected complications	6	15.0	32	80.0	2	5.0	29	72.5	10	25.0	1	2.5	87.2	0.000
Preventive measures of expected complications	10	25.0	21	52.5	9	22.5	34	85.0	4	10.0	2	5.0	86.7	0.000
Medications	25	62.5	2	5.0	13	32.5	35	87.5	5	12.5	0	0.0	14.1	0.02
Signs of pacemaker malfunction	0	0.0	17	42.5	23	57.5	29	72.5	11	27.5	0	0.0	96.4	0.000
Follow up care and visits	2	5.0	15	37.5	23	57.5	28	70.0	12	30.0	0	0.0	86.5	0.000

****A highly statistical significant difference p<0.001** *** only two answer**

Figure (3): Distribution of studied participants regarding to their total knowledge score

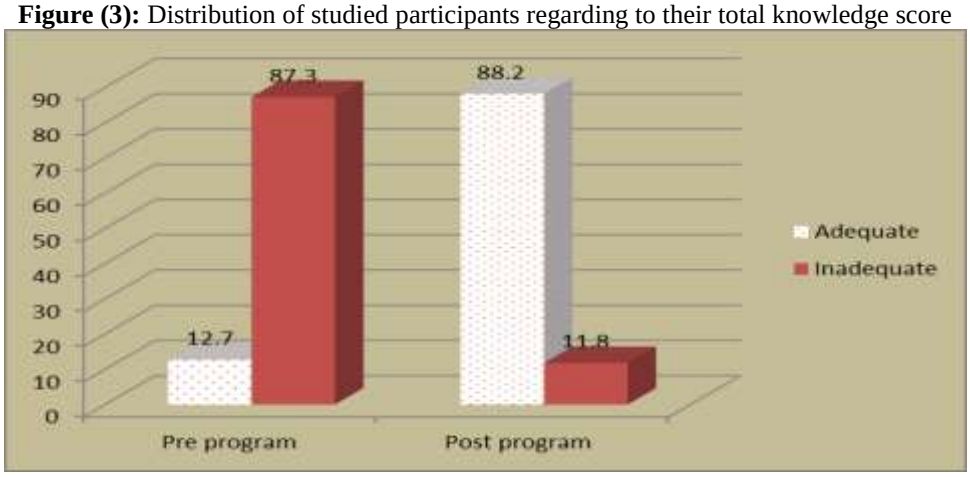


Table (3): Distribution of studied participants' practices as self-reported regarding to precaution of artificial pacemakers pre and post program implementation

Practices items	Pre program				Post program				X^2	p
	Done		Not done		Done		Not done			
	No	%	No	%	No	%	No	%		
Activity restrictions for 2 months after	2	5.0	38	95.0	35	87.5	5	12.5	93.8	0.000
Avoid use certain electrical devices over the pace-maker site	4	10.0	36	90.0	33	82.5	7	17.5	84.7	0.000
Avoid positions that cause pressure on the site	25	62.5	15	37.5	40	100.0	0	0.0	9.21	0.05
Notify all care providers of the	10	25.0	30	75.0	37	92.5	3	7.5	35.6	0.000
Carry the identification card of pacemaker at all times	28	70.0	12	30.0	40	100.0	0	0.0	12.8	0.04
Regular follow up care with the physician as recommended	24	60.0	16	40.0	34	85.0	6	15.0	9.8	0.06

Table (4): Distribution of studied participants' practices regarding to incision care, pulse, clothing and medic bracelet pre and post program implementation

Practices items	Pre program				Post program				X^2	p
	Done		Not done		Done		Not done			
	No	%	No	%	No	%	No	%		
Pacemaker implantation incision care	36	90.0	4	10.0	40	100.0	0	0.0	1.002	0.96
Measure the pulse rate	8	20.0	32	80.0	38	95.0	2	5.0	102.2	0.000
Avoid tight- fitting clothing over the pacemaker site	22	55.0	18	45.0	40	100.0	0	0.0	12.0	0.04
Wear a medic alert bracelet or tag	15	37.5	25	62.5	40	100.0	0	0.0	43.3	0.000

Figure (4): Frequency distribution of studied participants regarding total practices score

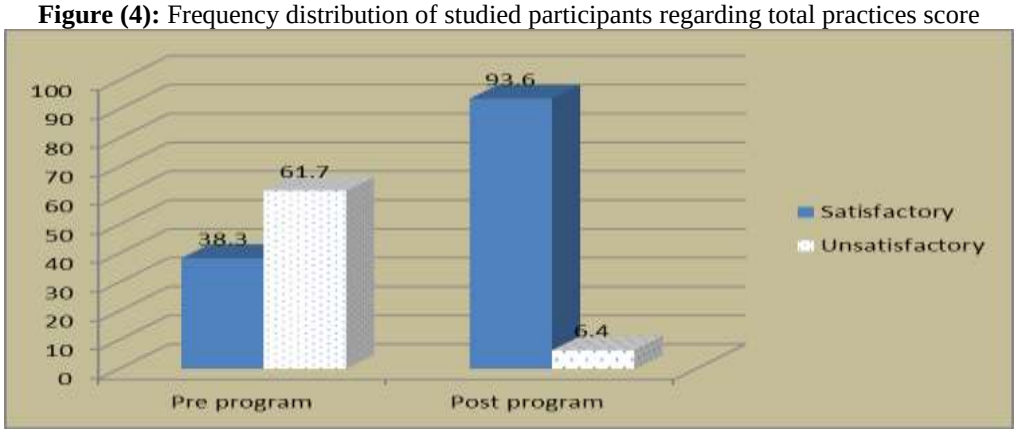


Table (5): Correlation between studied participants' total knowledge score and their total practices score

	Total knowledge score	
	r	p-value
Total practices score	0.73	0.000

Table (6): Distribution of studied participants regarding home environment (n=40)

Items	**Good**		**Moderate**		**Poor**	
	No	%	No	%	No	%
***Magnetic field**						
Outside	16	40.0	9	22.5	15	37.5
Inside	4	10.0	4	10.0	32	80.0
Ventilation	22	55.0	12	30.0	6	15.0
Sanitary water supply	40	100.0	0	0.0	0	0.0
Sewage disposal	40	100.0	0	0.0	0	0.0
WC cleanliness	32	80.0	8	20.0	0	0.0

VI. Discussion

Regarding to the socio demographic characteristics of studied sample, the current study revealed that more than one third of studied sample aged 60 years or more with mean ±SD 65.7±5.7, less than half had secondary education, more than half married, less than two thirds didn't work and less than half hadn't sufficient income. These findings are in congruence with **Nasr et al.** [4] who studied the impact of counseling program on knowledge and self-efficacy of patients with implanted permanent pacemaker, this study carried out in Ain Shams University hospital, Cairo, who found that more than half of studied patients were in the age group of 60 and more, three quarters of them were married, However, their studied result regarding educational level "slightly less than two thirds of them were illiterates" does not match the current study finding.

More than half of the studied sample was male. In the same line, **Abu-Salem et al.** [2] who applied emotional and physical rehabilitation protocol on patients undergoing permanent cardiac pacemaker implantation, who revealed that more than one half of studied sample were male. However, this finding disagrees with **Antony** [14] who studied knowledge assessment of patients after permanent pacemaker implantation regarding home care management, who found that more than half of the studied sample were female. Concerning the co-morbid diseases, more than one third of studied sample had cardiac disease, more than half had diabetes mellitus, more than one fifth had hypertension and only few of them had kidney diseases. In this respect **Nasr et al.** [4] found that one fifth of the patients had hypertension and slightly more than another fifth of the patients had ischemic heart disease. As well, less than one fifth of the patients had diabetes mellitus.

There were improvement post program in studied sample knowledge regarding basic structure and function of the heart, pulse and artificial pacemaker with statistically significant differences regarding all knowledge items. These findings agree with **El-dein et al.** [15] who studied permanent artificial pacemaker: impact of a designed nursing intervention protocol on patient's knowledge, skills as well as prevention of complications, revealed that all subjects of the study and control group, had unsatisfactory knowledge level before protocol application, this percentage reduced to (3.3%, 6.7%, 10% respectively) after one and two months of protocol implementation. A high significant statistically differences were found between three phases.

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. This may be attributed to the need of the studied patients to save their lives through gaining knowledge about pacemaker. In the same line, **Nasr et al.** [4] mentioned that there was statistically significant improvement in the posttest compared to the pretest related to studied participants' knowledge. Moreover, according to **Sreelekshmi** [16] who studied assessment the knowledge of homecare management of permanent pacemaker implanted patients in Sctimst, Trivandrum, who stated that, studied sample had inadequate knowledge regarding homecare management post permanent pacemaker implantation. In relation to studied sample self-reported practices, there were statistically significant differences in all studied sample practices as self-reported between pre and post program. This may be due to the positive effect of the home care program.

There were statistically significant difference in studied sample practices between pre and post program related to pacemaker incision care, pulse, avoiding tight clothes, and wearing medic bracelet. This may be related to the need of studied sample to acquire skills to keep pacemaker device functioning well. Additionally, the results also confirmed that there were improvement of patients' total practices post program to reach most of

studied sample had satisfied practices score compared by more than one third pre the program. This finding disagrees with **El-dein et al.** [15] who clarifies that studied patient's ability to count their own pulses improved but it didn't reach the level of statistical significance because time of study was limited for study group.

The results of the present study revealed that, there was a positive highly statistically significant correlation between studied sample total knowledge score and their total practices score. This may be attributed to order sequences the patient who had good knowledge score perform care much better for themselves.

Most of studied sample had good score in all items regarding home environment; except for magnetic field inside their home which they had poor score. This may attribute to modern life, all patients had sources of magnetic field inside their homes as T.V, mobile phone, recorder, computer, and hairdryer so the patient need to take care to keep adequate distance between them and these devices. According to **Medtronic** [17] recommended that patients must keep them away of electromagnetic fields in their home environment at least 6 inches equal 15 centimeters.

VII. Conclusion

Based on the results and hypotheses of the present study, the home care program improved the patients with permanent pacemaker insertion knowledge and practices regarding pacemaker. These study findings were supported the study hypotheses.

VIII. Recommendations

Based on the findings of the current study, the following recommendations can be suggested:

- Continues of home care program to all patients with permanent pacemaker insertion to improve their knowledge and practice regarding permanent pacemaker.
- Dissemination of posters, booklets, and leaflets for patients with permanent pacemaker insertion, which describe care practices of permanent pacemaker in combined with basic knowledge about it in cardiology departments.
- A further researches on a large sample is recommended to achieve more generalization.

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