

Effect of Cardiac Rehabilitation Program on Quality Of life of Patients Undergoing Heart Valves Surgeries

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Abstract

Cardiac rehabilitation is a safe and effective way to treat patients who have experienced cardiac events. **The aim** of the present study is to evaluate the effectiveness of cardiac rehabilitation program on quality of life of patients undergoing heart valves surgeries. Quasi-experimental, pretest – posttest was utilized in this study. A convenience sample of sixty adult male and female patients .**The first tool** " Patient's health need assessment sheet " **second tool** " German version of the Short-Form Health Survey (SF-36)." **Results** concluded that; All subscales scores of the SF-36 survey was shown to have a significant increase after application of cardiac rehabilitation program. **Conclusion:** Providing written program for patients was much more effective on improvement health-related quality of life of patients undergoing heart valvular surgeries. **Recommendations:** a nurse rehabilitator is of great value in both cardio thoracic surgery department and the out-patient clinic and a rehabilitation program are of great importance for the cardiac patients.

Keywords: *Heart Valves Surgeries , Cardiac Rehabilitation Program & Quality of Life.*

Introduction

Valvular heart disease may be congenital, acquired, or both (as in progressive calcification of a congenitally bicuspid aortic valve or endocarditis of a congenitally malformed mitral leaflets). Acquired Valvular heart disease may be of rheumatic or non-rheumatic origin. Until the mid-20th century, the predominant etiology of acquired valvular heart disease worldwide was rheumatic, a nonsuppurative cardiovascular sequel of group A streptococcal pharyngitis.(Mann, 2015)

The prevalence of moderate to severe valvular heart disease is highly age dependent, ranging from an estimated 0.7% in 18 to 44 years olds to 13.3% among those 79 years of age or older. Given the aging population in many developed countries, the percentage of senior with significant heart valve disease is projected to rise substantially in coming years , moreover, an increasing number of adult patients with congenital heart disease it contributes further to the growing number of patients when will require high-risk surgical procedures in the future (Marijon et al., 2007)

Heart valve replacements (HVRs) of diseased cardiac valves by prostheses is common and often lifesaving for patients with significant valvular lesions, stenosis or regurgitation. Depending on the severity of the condition, HVRs are an expensive yet critical procedure used to restore proper valve function with

an increasing number of replacements each year. Worldwide, the number of prosthetic heart valves implanted was approximately 300,000 in 2010 and is increasing at the rate of 5-7% per year(Butany, 2006 & Kemp, 2012)

Cardiac rehabilitation is the restoration of a person to an optimal state of function in 6 areas; physical, physiological, Mental, Spiritual, Economic, and Vocational. Cardiac rehabilitation programs can improve the quality of life, help patients return to their previous level of functioning in work and daily life, increase fitness, facilitate heart-healthy behavior changes and management of risk factors, and reduce costs by decreasing frequency and expense of hospital stays. "Long-term cardiac rehabilitation program favorably influences a reduction in lipid profile and lipoprotein and has possible effect in risk factors. (Wenger, 2007 & Dracup et al., 2009)

Improving the quality of life (QoL) is the main focus of CR programs and is monitored by professionals during Phase II of the rehabilitation process. A patient's overall QoL is influenced by environmental constraints, coping mechanisms, and personal feelings .Among patients with cardiac disease, women had poorer QoL than men and expressed more worry about overall health along with anxiety, depression, and self-esteem problems. Despite gender differences, cardiac patients exhibited concern about

physical functionality, capacity for self-care, ability to play a meaningful role in the workplace, and feelings of well-being and comfort (Shephard & Frankli, 2001 & Pica, 2011)

Significance of the study

From the researcher's clinical experience it has been observed that the patients undergoing heart valve surgery and their families need awareness. Learning and follow up in all changes that they confront after valve heart surgeries. Those patients are in that need so as to be adapted to these changes through their daily life activities. Due to the shortage in nursing researches in this area, this study would be conducted to investigate the effects of a cardiac rehabilitation program for those patients in order to limit the physiological and psychological effects of cardiac illness, reduce the risk of sudden death.

Aims of the study

The aim of the present study was to evaluate the effectiveness of cardiac rehabilitation program on Quality of life of patients undergoing heart valves surgeries through:

- ◆ assessing patient's needs (physical, psychological and social aspects)
- ◆ developing and implementing cardiac rehabilitation program for patients undergoing heart valves surgeries based on need's assessment.

Research hypothesis

To fulfill the aim of the study the following research hypothesis were formulated:

- The patients undergoing heart valves surgeries expose to cardiac rehabilitation program will significantly improve their quality of life.

Subjects & Method

Research design

Quasi-experimental, Pretest-posttest research design will be utilized to conduct this study.

Technical design

Setting

The study was conducted in cardio thoracic surgery department and outpatient clinic unit of cardio thoracic surgery at Assiut university hospital

Subjects

A convenience sample of sixty adult male and female patients undergoing heart valve surgery.

Note : sample size :from pilot study of 10 patients from studied patients the mean \pm of short form scale (36) was 19.3 ± 10.7 , null hypothesis was 25, power of study = 80 % and significance value = 0.05. Minimal required sample size of studied patients =30.

Tools for data collection

two tools for data collection were used to achieve the purpose of the current study.

Tool I: " Patient's health need assessment sheet "

This tool was developed by researcher based on the recent literature review to assess the patients' condition it consists of four parts , which cover the following

Part one: demographic data of the patients included in the study as (name, age, gender, occupation, level of education, date of admission and date of discharge)

Part two: patient's medical health history: current health status, Past, family history, health habits, risk factors, medications and previous surgical intervention.

Part three: it included patient's physical examination: Inspection, palpation, and auscultation were used to examine cardiovascular system done by the researcher.

Part four: it included post-operative data: which includes: Length of stay in intensive care unit(ICU-LOS(days), length of stay in hospital and post-operative complications

Tool II: German version of the Rand Short Form Health Survey (SF36) (Ware 1997)

This scale is a generic self-report survey which is a valid, reliable and acceptable tool for measuring physical as well as mental health status and is one of the most well-known instruments for measuring health status in cardiac patients .(Brazier et al., 1992; Pashkow et al., 1995, Dempster & Donnelly, 2000; Muller-Nordhorn et al., 2004 & Aude et al., 2006)

The Short Form (SF)-36 Health Survey is one of the most extensive, standardized, self-administered, generic questionnaires produced within the framework of the International Quality of Life Assessment (Ware, et al., 1994).

The SF-36 is a multi-item scale consisting of eight subscales which measure the health concepts of Vitality (VT), Role limitations due to Emotional difficulties (RE), Role limitations due to Physical difficulties (RP), Bodily Pain (BP), Social Functioning (SF), Physical Functioning (PF)General Health (GH) and Mental Health (MH). In addition, one single item assesses change in health status over the last year . Most items have been adapted from instruments over the last 20-40 years, or even longer (Ware & Sherbourne, 1992& Jorngarden et al., 2006).

Interpretation of the Short Form Health Survey (SF36)

Step 1: Scoring questions.

Question Number	Original Response	Recorded value
1, 2, 20, 22, 34, 36	1	100
	2	75
	3	50
	4	25
	5	0
3, 4, 5, 6, 7, 8, 9, 10, 11, 12	1	0
	2	50
	3	100
	4	50
	5	100
	6	100
13, 14, 15, 16, 17, 18, 19	1	0
	2	100
21, 23, 26, 27, 30	1	100
	2	80
	3	60
	4	40
	5	20
	6	0
24, 25, 28, 29, 31	1	0
	2	20
	3	40
	4	60
	5	80
	6	100
32, 33, 35	1	0
	2	25
	3	50
	4	75
	5	100

Step 2: Averaging items to form 8 scales.

Scale	Number of items	average The following items(question numbers)
Physical functioning	10	3, 4, 5, 6, 7, 8, 9, 10, 11, 12
Role limitations due to physical health	4	13, 14, 15, 16
Role limitations due to emotional problems	3	17, 18, 19

Scale	Number of items	average The following items(question numbers)
Vitality ; Energy and fatigue	4	23, 27, 29, 31
Emotional well being	5	24, 25, 26, 28, 30
Social functioning	2	20, 32
Bodily Pain	2	21, 22
General health	5	1, 33, 34, 35, 36

Step 3: figuring scores.

Rand recommends the following straight forward approach to scoring the Rand 36 items health survey. All questions are on a scale from 0 to 100, with 100 representing the highest level .Aggregate scores are compiled as a percentage of the total points possible ,using the Rand scoring table (step1)

The scores from those questions that address each specific area of functional health status (step2) are then averaged together, for a final score within each of the 8 scales measured.(eg. pain, physical functioning etc.)

For example, to measure the patient's energy/fatigue level, add the scores from questions 23, 27, 29, and 31. If a patient circled 4 on 23, 3 on 27, 3 on 29 and left 31 blanks, use table 1 to score them. An answer of 4 to Q23 is scored as 40, 3 to Q27 is scored as 60, and 3 to Q29 is scored as 40. Q31 is omitted. The score for this block is 40+60+40 =140. Now we divide by the 3 answered questions to get a total of 46.7. Since a score of 100 represents high energy with no fatigue, the lower score of 46.7% suggests the patient is experiencing a loss of energy and is experiencing some fatigue. All 8 categories are scored in the same way.

Cardiac rehabilitation program

It was developed by the researcher based on patient's needs assessment, literature review, researcher experience, and opinion of the medical and nursing expertise. It was formulated and introduced to the patients in the form of sessions. It was written in Arabic using simple language with illustration . The contents of the program were developed by researcher and revised by experts in the medical and nursing fields. It consisted of the following:

- ◆ **Education, discussion and counseling on**
- Basic anatomy and physiology of the heart
- General instructions to the patients undergoing heart valve surgeries about the surgery.
- The most common complications after heart valve surgeries.

- Risk factors for heart disease and their modification for secondary/ ongoing prevention
- Management of symptoms – chest pain/ warning signs of heart attack, breathlessness, palpitations
- Medications – indications, side-effects, the importance of adherence.
- Diet restriction and allowances in each group, body weight and how to control it.
- Marriage, pregnancy and sexual life after heart valve surgery.
- Psychological issues – mood, depression, emotions, sleep disturbance
- Smoking and its risks after heart valve surgery.
- ◆ Teaching the patients how to count pulse rate.
- ◆ Teaching the patients the exercises and activity after heart surgery.

Methods

The study was conducted through:

- ◆ Data were collected at the Cardiothoracic Surgery department, outpatient clinics of the Cardiothoracic Surgery at Assiut University Hospital during the period from 11/2014 to 2/2016.
- ◆ The study tools were developed based on the related literature and tested for its validity (by a group of (5) expertise in medical-surgical nursing specialty) and tested for its reliability .
- The cardiac rehabilitation program was developed after a review of related literature and based on patients identified needs.
- ◆ An official permission was obtained from the head of Cardiothoracic Surgery department for data collection after explaining the aim of the study.
- ◆ Patient's agreement for voluntary participation was obtained after the purpose and nature of the study were explained.
- ◆ Data were assured confidentiality and anonymity and were collected using the pre-mentioned study tools.
- ◆ A pilot study was conducted on 10% (6) of patients to examine the feasibility of the study , clarity of the tools and to estimate the time for data collection.
- ◆ The effect of implementing the cardiac rehabilitation program on patient's quality of life was evaluated through introducing a tool (II) for all studied sample three months after the application of the CRP, then after six months.
- ◆ After diagnosing the patient as valvular heart diseases and he / she is admitted to cardiothoracic surgery department, the researcher meet with each patient individually, the study and its aims are explained to the patient.
- ◆ After the patient's discharge from the hospital, the researcher meets the patient for follow-up in cardiothoracic surgery outpatient clinic after three

then six months for re-evaluating the patient's condition.

- ◆ The cardiac rehabilitation program was administered to the patient in nine sessions. The number of patients in each session was different according to the flow of patients. Sometimes one patient in a session, two patients in a session, and not exceed more than three patients in a session. Each session time ranged from 30 to 45 minute.
- ◆ The session ended by a summary of its content and feedback from the patients through discussion and asking questions.
- ◆ Each patient in the study obtained a copy of the cardiac rehabilitation booklet.
- ◆ The evaluation was carried out through introducing a tool (II) for all studied sample three months after the application of the CRP, then after six months.
- ◆ The collected data were tabulated and statistically analyzed to evaluate the differences between the pre and post application of the cardiac rehabilitation model and in the follow-up period (after 6 months),the statistical analysis included percentage, mean, and standard deviation. A probability level of 0.05 was adopted as a level of significance for testing the research hypothesis.

Results

Table (1): Distribution of demographic characteristics of studied patients undergoing heart valve surgery(n=60).

Variables	No	%
Age groups		
18-<20 years	6	10.0
20-<40 years	46	76.7
40-65 years	8	13.3
Mean \pm SD	31.8 \pm 8.7	
Sex		
Male	28	46.7
Female	32	53.3
Marital status		
Single	14	23.3
Married	46	76.7
Level of education		
Secondary education	8	13.3
Basic education	2	3.3
Read and write	22	36.7
Illiterate	28	46.7
Occupation		
Employee	12	20.0
Farmer	16	26.7
House wife	32	53.3
Hospital stay		
< one week	4	6.7
One week	4	6.7
More than one week	52	86.6
Mean \pm SD (days)	18.6 \pm 11.5	

Table (2):Percentage distribution for medical data of the studied patients undergoing heart valve surgery(n=60) as regarding to current health problems.

Medical data in relation to current health problems	Yes		No	
	No	%	No	%
Chest pains	56	93.3	4	6.7
Dyspnea	58	96.7	2	3.3
Palpitations	60	100.0	0	0.0
Cough	32	53.3	28	46.7
Hemoptysis	6	10.0	54	90.0
Nocturia	6	10.0	54	90.0
Edema of feet or ankles	24	40.0	36	60.0
Extremity pain or paresthesias	36	60.0	24	40.0
Fatigue	58	96.7	2	3.3
Dizziness	54	90.0	6	10.0
Syncope	22	36.7	38	63.3
Nausea	28	46.7	32	53.3

Table (3): Percentage distribution for medical data of the studied patients undergoing heart valve surgery(n=60) as regarding to postoperative complications.

Post-operative complications	Present		Not present	
	No	%	No	%
1- Local complications				
Deep sternal wound infection	8	13.3	52	86.7
2- Systemic complications				
1- Respiratory complications				
a) Pneumonia	4	6.7	56	93.3
2- Circulatory complications				
a) Hemorrhage	1	1.7	59	98.3
b) Pericardial effusion	2	3.3	58	96.7
c) Pleural effusion	2	3.3	58	96.7
d) Atrial fibrillation	2	3.3	58	96.7
Gastrointestinal complications				
a) Nausea and vomiting	40	66.7	20	33.3
b) Constipation	14	23.3	46	76.7

Table (4): Comparison between pre, after 3 months and after 6 months as regard short form scale Sf36 (8scale) of studied patients undergoing heart valve surgery(n=60).

Subscales	Pre	After 3 months	After 6 months	P1	P2	P3
Physical functioning	13.8±16.3	67.8±11.9	87.3±10.1	0.001**	0.001**	0.001**
Role limitation due to physical health	3.3±18.1	24.2±37.7	68.3±46	0.002**	0.001**	0.001**
Role limitation due to emotional problems	3.3±18.1	65.6±43.8	90±30.3	0.001**	0.001**	0.001**
Vitality; Energy and fatigue	21±13.8	53±7.4	63±8.5	0.001**	0.001**	0.001**
Mental health	35.5±12.5	60.4±10.5	72.3±7.2	0.001**	0.001**	0.001**
Social functioning	25.4±14.4	59.6±12.9	80±11.6	0.001**	0.001**	0.001**
Bodily pain	28±9.8	56.3±9.9	78.6±12.9	0.001**	0.001**	0.001**
General health perception	28.8±10.5	60.3±6.9	73.8±11.8	0.001**	0.001**	0.001**
Health comparison question(health change)	20±17.7	69.2±12.5	90±12.4	0.001**	0.001**	0.001**
Total SF 36 scale	19.3±10.7	58±10.8	78±12	0.001**	0.001**	0.001**

Paired t-test used for this comparisons

** Statistically significant difference ($p < 0.01$)

P1: Comparison between pre and after 3 months

P2: Comparison between pre and after 6 months

P3: Comparison between after 3 months and after 6 months

Table (1): shows that; three-quarters (76.7%) of studied patients their age ranged from(20-<40 years). Regarding sex, it was found that more than half (53.3%) of studied patients were female .It was found that the highest percentages of studied patients were married, illiterate and housewife. Regarding hospital stay, it was found that the highest percentages of studied patients stayed in hospital more than one week.

Table (2) : shows that; the vast majority (93.3%, 96.7%,100% &96.7%) of studied patients had chest pain, dyspnea, palpitations and fatigue respectively. The majority (90%) of studied patients had dizziness and less than two third (60%) had extremity pain or paresthasias. While more than half (53.3%) of the studied patients had a cough.

Table (3): illustrates that; as regarding local complications less than the fifth percentage(13.3%) had a deep sternal wound infection. As regarding respiratory complications (6.7) of the patients had pneumonia. As regarding circulatory complications (3.3) of the patients had Pericardial effusion , Pleural effusion, and atrial fibrillation. As regarding gastrointestinal complications two third (66.7%) of the studied patients had nausea and vomiting and less than quarter (23.3%) of them had constipation.

Table (4): illustrates that; there was a significant difference between pre and follow-up phases(3 months and 6 months) among studied patients as regarding SF-36 at p-value(0.001).This mean improvement in the quality of life among studied patients after the application of nursing intervention cardiac rehabilitation program (NICRM).

Discussion

The finding of the present study showed that patients' characteristics revealed that, patients age were in the age group from 20-<40 years old and Mean+ SD 31.8+8.7 In the same line with **Aicher, (2011)** who study sample ranged in age from 18–45 years and Mean + SD 38 ±6.

The current study revealed that more than half of the studied patients were female. This is in accordance with **Manjunath, (2014)** who found that Multivalvular disease was seen more often in females in a ratio of 1.2:1. This finding is inconsistent with **Giakoumidakis et al., (2011)** ; mentioned that sixty-seven percent of the studied patients were male

In the current study; it was found that the highest percentages of studied patients married and illiterate. This study finding was supported by **Azer, (2011)** who reported that more than half of the patients were married and illiterate.

As regards occupation, results revealed that more than half of subjects were housewives .This finding

could be attributed to many factors such as overload of the heart from multipara, not using body mechanics in house activities and decrease physical activity which leads to increased body weight. These results agreed with **Azer, (2011)** who found that more than one-third of subjects were not working (housewives) in study and control group.

As regarding to current health problems, results showed that, the vast majority of subjects had chest pain and dyspnea, these results were in line with **Chernecky and Berger, (2004)** who reported that, all patients with cardiac disease had complained with dyspnea , although the vast majority of studied patients had palpitation, these results were in line with those of **Azer, (2011)** who reported that more than two third of study group and all patients who participate in control group have palpitation and nocturnal dyspnea.

According to post-operative complications after heart valve surgery . It was found in the present study eight patients (13.3%) had a deep sternal wound infection. This study finding in the line with **Kashmiri (2008)** who found that four patients had a wound infection.

In the pre-application phase of the nursing intervention cardiac rehabilitation program (NICRM) in this study , it was observed that all patients were having a poorer quality of life on all SF-36 subscales(pre19.3).After application of NICRM in follow-up period there was a highly significant improvement in the quality of life on all SF-36 subscales(follow up 58&78). This results clarifies that, cardiac rehabilitation program can improve quality of life, this results are consistent with **Bisbee (2012)**,who found that cardiac rehabilitation programs can improve quality of life, help patients return to their previous level of functioning in work and daily life, increase fitness, facilitate heart-healthy behavior changes and management of risk factors, and reduce costs by decreasing frequency and expense of hospital stays.

These results supported by **Boudrez & De Backer (2001)** they found that there would be a statistically significant difference between the paired pre-test and post-test SF-36 scores, with higher post-test scores reflecting the positive effect of the CRP on the participant's health-related quality of life.

Conclusion

The result of the present study concluded that; all subscales scores of the SF-36 survey were shown to have a significant increase following a three and six months cardiac rehabilitation program, which indicated that the quality of life of studied patients improved after application of cardiac rehabilitation program(CRP), these results supported the study

hypothesis.

Recommendation

For patients

- A continuous educational and rehabilitation program planned and offered on a regular basis to a cardiac patient in cardiothoracic surgery department and outpatient clinic of the cardiothoracic surgery.
- Increase patients' awareness about the importance of periodic check up to prevent developing any complications which can affect their quality of life.

In services

Providing a written cardiac rehabilitation instruction booklet is of great importance for the patients.

For research

- Replication of the current study on larger probability sample is recommended to achieve generalize ability and wider utilization of the designed program.

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