Improved quality of life with cardiac rehabilitation in post-myocardial infarction patients

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ABSTRACT: The aim of this study is evaluating the effect of cardiac rehabilitation on the improvement of quality of life in patients with acute myocardial infarction. Cardiac dysfunction is one of the most common causes of limitation in physical activity and activities of daily living. A quasi-experimental design study with a randomized, pretest-posttest control group. Sixty patients were selected and randomly assigned to either control (n=29) or experimental group (n=31). Baseline data were collected at three weeks post acute myocardial infarction prior to the delivery of the intervention, while and a post-test was administered eight weeks after rehabilitation. The data collected consisted of demographic data questionnaire and quality of life standard questionnaire. The data were analyzed using SPSS 16.0. Descriptive and analytical statistics methods were used. The results show a significant differences in the average scores of the experimental and control groups (P=0.000, P=0.001, respectively). According to results, the average score of the eight week (Experimental: p=0/000 Mean=3.35 S.D=2.73 Control: P=0.001 Mean=2.27 S.D=2.20) was better than that of the third week for both groups. It is important for nurses to become familiar with various manifestations of coronary artery conditions and methods for assessing, preventing, and treating these disorders. We can conclude that cardiac rehabilitation programs should be comprehensive and involve physiological and psychological strategies rehearse much and recommended in most contemporary clinical practice guidelines. The finding from this study may be beneficial for clinical nurses to manage the needs of patients with MI. Rehabilitation centers for cardiac rehabilitation gives the post myocardial infarction patients the chance to use these programs and improve their quality of life and increase their independence and change their life-style.

Keywords: Cardiac rehabilitation, Coronary heart diseases, Exercise, Myocardial infarction, Quality of life.

Introduction

In recent decades coronary heart disease (CHD) has been the most common cause of death for both women and men in … (Afzalahghei et al. 2010). CHD is a chronic condition needing long-term rehabilitation measures to decrease mortality, morbidity and improve quality of life (Lloyd-Jones et al. 2010). Cardiac rehabilitation (CR) is a long- term multifactorial rehabilitation program aimed at the secondary prevention of cardiovascular events (Fernandez et al. 2011). Each individual affected by cardiovascular disease can benefit from either an in-patient or out-patient CR program. The first components of CR should start as soon as possible after hospital admission. Follow-on CR is a necessary component to reach and maintain CR goals on the medium and long-term. Secondary prevention through exercise-based CR is the intervention with the best scientific evidence to contribute to decrease morbidity and mortality in coronary artery disease, in particular after myocardial infarction (Piepoli et al. 2010). Substantial research evidence supports multiple benefits of cardiac rehabilitations for medical or surgical
revascularization, e.g. following an acute myocardial infarction, acute coronary syndrome, CABG, or percutaneous coronary intervention (Taylor-Piliae et al. 2010).

Cardiovascular diseases are the most common cause of illness and disability in the developing countries (Mandeghar et al. 2008). According to WHO in March 2006, 32% of fatalities in Iran were caused by cardiovascular diseases (Berger 2008). Acute coronary syndrome (ACS) is an emergent situation characterized by an acute onset of myocardial ischemia that results in myocardial death (ie, MI) if definitive interventions do not occur promptly (Smeltzer et al. 2010). Severe myocardial Infarction is one of the most common causes of hospitalization in industrial countries (Badir 2007). The rate of early fatality (thirty-day period) because of cardiac arrest is 30% (Beaver et al. 2008). More than half of the cases happen before the person reaches the hospital (Maghbol 2007). Although the rate of fatality after hospitalization has been reduced by almost 20%; out of twenty-five patients discharged from the hospital, one will lose his/her life within the first year after myocardial infarction (Yohannes Abebaw et al. 2010). The rate of survival is especially low among the elderly (Harrison & Braunwald 2008).

Myocardial infarction is not always caused by severe reduction or severance of the blood flow of coronary artery due to thrombosis of atherosclerotic coronary artery. Complete or partial block of the coronary artery might occur because of the thrombosis or embolus (Cotter et al. 2009).

New information that relates to the development of atherosclerosis has increased the understanding of treatment and prevention of this progressive and potentially life-threatening process. Four modifiable risk factors- cholesterol abnormalities, tobacco use, hypertension, and diabetes mellitus- have been cited as major risk factors for CAD and its complications. As a result, they receive much attention in health promotion programs (Smeltzer et al. 2010).

Researchers agree that quality of life is a virtual perception and contains the negative and positive aspects of the person’s life and it explains the way that a person perceives the other aspects of his/her life and how he/she reacts to them (Dehghanazadeh et al. 2001).

Quality of life has different aspects which might be of different levels of importance in each individual. In chronic disease patients, especially because of their longevity and severity, the physical, mental, social and economical aspects of the person’s life change to a great extent. At the present time most governments consider the improvement of quality of life an inseparable part of social and economic development (Johnson et al. 2010). Dehdari et al. consider life to be consistent of physical, mental and social aspects that are limited to experiences, beliefs, expectations and perception of the patient (Dehdari et al. 2007). The results of clinical analyses show that quality of life can be a sign of quality of medical care and a part of the disease management program. Thus instead of using classical measures like fatality to observe the results of medical care, quality of life is used (Dehghanzadeh et al. 2001).

After the patient with an MI is free of symptoms, an active rehabilitation program is initiated. Cardiac rehabilitation is an important continuing care program for patients with CAD that targets risk reduction by means of education, individual and group support, and physical activity. The goals of rehabilitation for the patient who has had an MI are to extend life and improve the quality of life. The immediate objectives are to limit the effects and progression of atherosclerosis, return the patient to work and pre illness lifestyle, enhance the psychosocial and vocational status of the patient, and prevent another cardiac event (Smeltzer et al. 2010).

Cardiac rehabilitation services are comprehensive programs involving education, exercise, counseling and behavior modification designed to reduce adverse physiological and psychosocial outcomes of heart disease, risk of incident recurrence and mortality. As such, the goal of cardiac rehabilitation programs is not only to prolong life but also to improve physical functioning, symptoms, wellbeing and health-related quality of life (Höfer et al. 2009, Heart Disease Weekly 2010, Ski & Thompson 2011).

The aim of this study was to determine the effects of a cardiac rehabilitation program in improving quality of life (QOL) in post MI patients in ….

Methods

We conducted a quasi-experimental design study with a randomized, pretest-posttest control group that evaluated the effectiveness of the intervention with a cardiac rehabilitation program in Patients with acute MI hospitalized in …Hospital in….

1. World Health Organization
Sixty patients (36 males and 24 females) were recruited and randomized using a random number table into control (n=29) and CRP groups (n=31) 3 weeks post-MI. Prior to intervention (Time 1) and after 8 weeks (Time 2), exercise capacity and health related quality of life were measured. A pre-test was administered three weeks post-acute myocardial infarction and a post-test was administered eight weeks after rehabilitation to both groups. The data collected consisted of demographic data questionnaire and quality of life standard questionnaire (Nottingham Health Profile questionnaire).

Inclusion criteria: 1- Having a first diagnosis of acute myocardial infarction; 2- lacking a history of coronary artery bypass graft (CABG) or coronary artery disease (CHD); 3- Age over 35 years 4- Left ventricle ejection fraction (LVEF) >35%; 5- No contraindications for movement and weight bearing. After explaining the study to the patients, they were required to provide the researcher with a written consent. Right after the initial assessment, the members of the control group were asked to do a home-based exercise program and received the current treatment of visiting cardiologist and following cardiologist treatment instructions.

The experimental group and the control group both received the Nottingham Health Profile (NHP) at three weeks post acute myocardial infarction and eight weeks post completion of cardiac rehabilitation program.

First, an individual education session was held by the CRP coordinator. The session included the strategies on how to modify the coronary artery risk factors, acute myocardial infarction experiences and the difficulties to overcome during the first 3 weeks after discharge. During the 8 week period, a dietitian held a session on dietary education and how to change one’s eating habits. This was a one-on-one basis for the experimental group prior to starting the exercise regimen for the cardiac rehabilitation program. The cardiac rehabilitation program consisted of nutritional and psychological consultation and twenty-four physical activity sessions. Each physical activity session was 45 to 60 minutes consisting of 5 to10 minutes of warm-up and 30 to 40 minutes of aerobic exercise and 5 to10 minutes of cool down phase while being monitored and instructed by an exercise physiologist and a CRP nurse.

Each exercise training session was repeated 3 times per week. Echocardiogram, electrocardiogram (ECG) and blood tests were done prior to the cardiac rehabilitation program and post cardiac rehabilitation program.

The Nottingham Health Profile (NHP) consists of six dimensions: energy (3 questions), pain (8 questions), emotional reaction (9 questions), sleep (5 questions), social isolation (5 questions) and physical activities (8 questions). In total, the questionnaire contains 38 questions. The NHP and the demographic questionnaires were completed by verbally asking the patients and documenting the answers. Two-week test-retest reliability for the NHP was 0.92. Internal consistency (alpha) of this scale have ranged from 0.88 to 0.95 for the overall NHP score and from 0.75 to 0.95 for the six subscales. All the translations has been revised and approved by an English expert. Data analysis was performed using spss Version 16.0 statistical software. Descriptive statistic was used to test demographic data and outcome variables. Dependent and independent t-tests were used to analyze differences in continuous data between mean scores for the intervention and control groups. To assess the group differences in dependent variable changes, repeated measures ANOVA were used. The level of significance was set at P =0.05.

**Ethical considerations**
This study abided by the Helsinki Declaration at all stages of its running and has been authorized by the …. Hospital and …. University ethics committee.

**Results**

The mean age, gender, marital and employment status except education were almost identical between the cardiac rehabilitation program group and the control group. The clinical characteristics, including coronary risk factors, LVEF, site of MI, and treatment modalities (percutaneous coronary intervention and medications), did not differ significantly between the two groups (Table 1).

The difference between scores of NHP and its six dimensions (Energy level, pain, emotional reaction, sleep, social isolation, and physical abilities), in both groups indicates that there is a significant difference (P-value=0.000) between the mean scores using the t-test for Equality of Means. Thus with 95% degree of certainty (95% CI) we could conclude that the cardiac rehabilitation program is more effective in the experimental group (table 2) compared to the control group.
The NHP scores in 3-week period and 8-week period for the control group indicates that there is a significant difference. The variables of energy, pain, social isolation, and total quality of life score are significant with $p$-value = (0.031, 0.003, 0.005, and 0.000 respectively). Therefore there is a significant difference between quality of life of patients in 3 weeks and 8 weeks in the control group ($p=0.000$).

The NHP scores in the experimental group at 3 weeks and 8 weeks show that there is a significant difference ($p$-value=0.05). The average scores of the 8th week are generally better than those of the 3rd week, especially in the experimental group.

There is a significant difference ($p$-value=0.05) between the health of the patients at 3 and 8 weeks in both groups (table 3).

The results for the total population demonstrate that the average quality of life was better for male than female although not statistically significant. There is also a significant difference ($p$-value=0.005) between the life quality of myocardial infarction patients with diabetes versus non diabetic patients. There is a significant difference ($p$-value=0.05) between the life quality of myocardial infarction patients with elevated LDL compared to low LDL. The left ventricle ejection fraction of patients after 8 weeks is better than those of the 3-week patients and the difference is significant ($p$-value=0.05).

Discussion

Cardiovascular diseases (CVD) are one of the most common and fatal diseases in the present human society. The ongoing investigations illustrate that in Eastern Mediterranean and Middle Eastern countries cardiovascular diseases are growing in numbers and increasing the disability rates. (Lamotte et al 2010, Ham & Kim 2010). Cardiovascular diseases are the most prominent fatality cause in the country. According to our study 60% of the samples were male and 40% were female. The risk of having a myocardial infarction in women who are at the fertility age compared to the men of the same age is one-fourth (Garza et al. 2009). This could be explained through the estrogen hormone. This big difference is reduced after reaching the age of menopause, and at the age of 50 the chance of myocardial infarction becomes equal (Asgary & Soleimani, 2008). Study conducted by Fagring et al. shows no difference regarding sex with regards to the extremity of chest pain. Women described their pain burning and crushing but this anomaly could be described with age range (Fagring et al. 2007). The research demonstrated that the majority of the samples were between 45 and 75 yrs. The rate occurrence increases after 30 years of age and reaches its second peak between 45 and 75 years of age. The chance of atherosclerosis increases with age. In most cases the disease is seen in people older than 40 years old (Gutierrez & Peterson, 2007). Half of the patients are over 65 years old (Nough et al. 2008).

One-third of the fatality caused by cardiovascular diseases occurs in people under 65 year old. The results indicate that 31.7% of the samples were smokers. Smoking, hypertension and hypercholesterolemia are the three most common factors for myocardial infarction (Stillwell, 2006). The chance of a myocardial infarction doubles in smokers. For smokers the chance of a sudden cardiac death is ten times more than that of the non-smokers (Asgary & Soleimani, 2008). 46.7% of the samples had hypertension and the rest had normal blood pressures. Men over 45 years old with blood pressure higher than 140/90 and all adult women with blood pressure higher than 160/95, have 50% more chance of fatality compared to people with normal blood pressure (Vaillancourt et al. 2008). People with hypertension have five-fold increased chance of myocardial infarction. The higher the blood pressure, the higher the chance of a cardiac arrest (Nowak & Handford, 2004).

The difference in the life quality score (NHP) of the two groups indicates a significant difference ($p$-value=0.05). The effect of the cardiac rehabilitation program is more significant in the interventional group than the control group. Dehdari et al. concluded that the quality of life calculated through NHP questionnaire regarding the aspects of energy, sleep, social isolation has a significant correlation in the interventional group in the three periods of time compared to the control group (Dehdari et al. 2007).

The difference in the life quality scores and its six dimensions for both groups in the two time periods indicate that there is a significant difference between the two averages. Thus we could derive with 95% certainty that there is a significant difference between the six dimensions aspects of the both group members after 3 and 8 weeks. According to previous studies there is a significant difference between the psychological/mental and health/motor scores for the CRP group compared to the control group. These findings illustrate that the cardiac rehabilitation program could cause notable change in quality of life and athletic capabilities (Choo et al. 2007).
The quality of life scores and its six dimensions in the two time periods for the interventional group indicated significant difference between the 3rd and 8th week results. Some previous studies have shown that cardiac rehabilitation could enhance HRQOL (Ski & Tompson 2011). According to the results, the average derived from the 8th week is generally higher than that of the 3rd week, especially for the interventional group. This result was not similar to that in a study by Jerant et al. (2009). They conducted a one-year self-management training program for people with chronic illness and found no significant effects at any follow-up point on PCS or MCS scores. However, several researchers did find a significant improvement in quality of life in previous studies (Wang et al. 2009, Piepoli et al. 2011). Thus we conclude that there is a notable change in quality of life in patients of both groups. In a study conducted by Bakhshandeh & Parhizghar, the results indicated that breathing exercises affects the life quality of asthma patients. Thus, it is imperative to include such activities in their training program (Bakhshandeh & Parhizghar, 2006).

Commonly, patients with cardiovascular disease face the need to change multiple behaviors; therefore, identifying the behavior that is most important to the client to change is a useful strategy (Thompson et al. 2011).

**Limitations**

a) Limitation within the researcher’s control:
   1- The research cases are requested to avoid education out of rehabilitation program to prevent bias in results.
   2- The research cases are requested to follow the rehabilitation program precisely.

b) Limitations out of the researcher’s control:
   1- Research cases’ mood may affect their response during answering the questionnaire and checking their performance and consequently alter the results.
   2- Random response to some questions by research cases are uncontrollable.

**Conclusion**

The cardiac rehabilitation program can affect and improve the quality of life. The rehabilitation can have positive results on various aspects of life. Rehabilitation centers for cardiac rehabilitation gives the post-myocardial infarction patients the chance to use these programs and improve their quality of life and increase their independence and change their life style.

**Relevance to clinical practice**

One of the important nursing roles is patient education. Thus, nurses should play a significant role in the development and implementation of the programs, and to back health career, insurers and clients in the identifying of the holistic nature of cardiac rehabilitation. Development and implementation of structured cardiac rehabilitation programs with a more holistic approach can improve the quality of life. The enormous development and resulting investment in high-technology diagnostic and therapeutic procedures for CVDs in recent decades ensures increased survival. The challenge is to optimize the disability-free survival including active participation in social and economic life for patients after cardiovascular events or interventions (Bjarnason-Wehrens et al. 2010).

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**Conflict of interest**

There is no Conflict of interest to declare.
Author Contributions

Study Design: VS, ZME; data collection and analysis: VS, ZME; and manuscript preparation: VS, ZME.

Table 1. Demographic and sample characteristics at baseline (N=60)

<table>
<thead>
<tr>
<th></th>
<th>CRP (n=31)</th>
<th>control (n=29)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age (years), mean (S.D.)</td>
<td>53.9 (11.0)</td>
<td>57.2 (11.0)</td>
</tr>
<tr>
<td>Education (years), mean (S.D.)</td>
<td>12.6 (3.6)</td>
<td>14.5 (2.7)</td>
</tr>
<tr>
<td>Gender, n (%)</td>
<td>27 (87.1)</td>
<td>23 (79.3)</td>
</tr>
<tr>
<td>Marriage, n (%)</td>
<td>31 (100)</td>
<td>29 (100)</td>
</tr>
<tr>
<td>Employment, n (%)</td>
<td>15 (48.4)</td>
<td>12 (41.4)</td>
</tr>
<tr>
<td>Current smoking, n (%)</td>
<td>20 (69.0)</td>
<td>22 (71.0)</td>
</tr>
<tr>
<td>Hypertension, n (%)</td>
<td>19 (61.3)</td>
<td>16 (55.2)</td>
</tr>
<tr>
<td>Diabetes mellitus, n (%)</td>
<td>7 (24.1)</td>
<td>10 (16.7)</td>
</tr>
<tr>
<td>Body mass index (kg/m²)</td>
<td>24.9 (28.3)</td>
<td>31.3 (70.0)</td>
</tr>
<tr>
<td>Lipid profile (mg/dl), mean (S.D.)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total cholesterol</td>
<td>119.7 (38.7)</td>
<td>119.0 (30.5)</td>
</tr>
<tr>
<td>HDL cholesterol</td>
<td>41.0 (9.5)</td>
<td>41.9 (11.3)</td>
</tr>
<tr>
<td>LDL cholesterol</td>
<td>178.0 (30.2)</td>
<td>181.1 (40.5)</td>
</tr>
<tr>
<td>Triglyceride</td>
<td>119.0 (30.5)</td>
<td>137.0 (83.4)</td>
</tr>
<tr>
<td>Anterior site of MI, n (%)</td>
<td>20 (64.5)</td>
<td>21 (72.4)</td>
</tr>
<tr>
<td>LVEF (%), mean (S.D.)</td>
<td>53.9 (9.5)</td>
<td>41.9 (11.3)</td>
</tr>
<tr>
<td>QMI, n (%)</td>
<td>20 (64.5)</td>
<td>21 (72.4)</td>
</tr>
<tr>
<td>PCI, n (%)</td>
<td>23 (79.3)</td>
<td>21 (72.4)</td>
</tr>
<tr>
<td>Medication, n (%)</td>
<td>Beta-blocker</td>
<td>20 (64.5)</td>
</tr>
<tr>
<td>ACE inhibitor</td>
<td>23 (74.2)</td>
<td>23 (79.3)</td>
</tr>
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</table>

Table 2. Quality of life in the experimental group after 3 and 8 weeks

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Test</th>
<th>N</th>
<th>Mean</th>
<th>Std. Deviation</th>
<th>Std. Error Mean</th>
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<tbody>
<tr>
<td>Energy level</td>
<td>3 week</td>
<td>31</td>
<td>1.871</td>
<td>1.117</td>
<td>0.20076</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>0.3548</td>
<td>0.914</td>
<td>0.16427</td>
</tr>
<tr>
<td>Pain</td>
<td>3 week</td>
<td>31</td>
<td>4.16</td>
<td>2.922</td>
<td>0.52486</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>0.5484</td>
<td>1.479</td>
<td>0.26575</td>
</tr>
<tr>
<td>Emotional reaction</td>
<td>3 week</td>
<td>31</td>
<td>4.19</td>
<td>2.948</td>
<td>0.52960</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>0.7097</td>
<td>1.553</td>
<td>0.27899</td>
</tr>
<tr>
<td>Sleep</td>
<td>3 week</td>
<td>31</td>
<td>3.06</td>
<td>1.787</td>
<td>0.32107</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>1.0968</td>
<td>1.535</td>
<td>0.27574</td>
</tr>
<tr>
<td>Social isolation</td>
<td>3 week</td>
<td>31</td>
<td>1.32</td>
<td>1.194</td>
<td>0.21446</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>0.1935</td>
<td>0.477</td>
<td>0.08575</td>
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<tr>
<td>Physical abilities</td>
<td>3 week</td>
<td>31</td>
<td>3.67</td>
<td>2.761</td>
<td>0.49598</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>0.58</td>
<td>1.385</td>
<td>0.24876</td>
</tr>
<tr>
<td>Quality of life</td>
<td>3 week</td>
<td>31</td>
<td>18.29</td>
<td>9.98</td>
<td>1.79257</td>
</tr>
<tr>
<td></td>
<td>8 week</td>
<td>31</td>
<td>3.84</td>
<td>5.42</td>
<td>0.97371</td>
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Table 3. The health in the control & experimental groups after 3 and 8 weeks

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>t</th>
<th>df</th>
<th>Sig.(2-tailed)</th>
<th>Mean Difference</th>
<th>Std. Error Difference</th>
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<tbody>
<tr>
<td>Control group</td>
<td>3.86</td>
<td>29</td>
<td>0.001</td>
<td>1.55</td>
<td>0.41</td>
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<tr>
<td>Experimental group</td>
<td>4.52</td>
<td>31</td>
<td>0.000</td>
<td>2.71</td>
<td>0.59</td>
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References


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