Cardiac Rehabilitation after Myocardial Infarction: A Comparison between The Regular and Home-Based Cardiac Rehabilitation Program

Thesis

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Mohammed Menshawy

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List of Abbreviations

Abb.	Full term

ABP ..... *Arterial Blood Pressure*
ACS ..... *Acute Coronary Syndrome*
AMI ..... *Acute Myocardial Infarction*
BMI ..... *Body Mass Index*
BMS ..... *Bare Metal Stents*
CABG ..... *Coronary Artery Bypass Graft*
CAD ..... *Coronary Artery Disease*
CAP ..... *Care Assessment Platform*
CCU ..... *Coronary Care Unit*
CK ..... *Creatine kinase*
CK-MB ..... *Creatine Kinase-Myocardial Band*
CMR ..... *Cardiac Magnetic Resonance*
CR ..... *Cardiac Rehabilitation*
CRP ..... *Cardiac Rehabilitation Programs*
cTn ..... *Cardiac Troponin*
CVD ..... *Cardiovascular Disease*
D ..... *Dimensional*
DES ..... *Drug Eluting Stents*
DSE ..... *Dobutamine Stress Echocardiography*
ECG ..... *Electrocardiographic*
EF ..... *Ejection Fraction*
HBCR ..... *Home-Based Cardiac Rehabilitation*
HF ..... *Heart Failure*
HR ..... *Heart Rate*
ICT ..... *Information and Communication Technology*
IRA ..... *Infarct Related Artery*
IU/kg ..... *International Units/Kilogram*
LAD ..... *Left Anterior Descending*

List of Abbreviations (Cont...)

Abb.	Full term
LBBB	*Left Bundle Branch Block*
LDH	*Lactate Dehydrogenase*
LV	*Left Ventricular*
mg	*Milli Gram*
mg/dl	*Milligram/Deciliter*
MI	*Myocardial Infarction*
mmHg	*Millimeter Mercury*
MR	*Mitral Regurgitation*
PCI	*Percutaneous Coronary Intervention*
SC	*Step Counter*
STEMI	*ST Elevation Myocardial Infarction*
URL	*Upper Reference Limit*
WDC	*Wellness Diary Connected*

ABSTRACT

We compared between changes in both groups before and after CR regarding exercise test parameters including functional capacity, exercise time resting heart rate heart rate recovery and arterial blood pressure, Echocardiographic findings and lipid profile.

During our study, we observe that regular CR leads to improvement in exercise test parameters Echocardiographic findings and lipid profile also we observe that home-based CR does not have significantly inferior outcomes compared to center-based supervised program.

Keywords: Acute Myocardial Infarction - Coronary Artery Disease - Care Assessment Platform

INTRODUCTION

Acute myocardial infarction (AMI) is the leading cause of death in North America and Europe. Each year an estimated 785000 Americans will sustain a new myocardial infarction, and another 470000 will have a recurrent myocardial infarction. A new myocardial infarction occurs every 25 seconds and new case of death from myocardial infarction occurs every minute ***(Nienaber, 1998)***.

Several studies have demonstrated a benefit from myocardial reperfusion, with reduced infarct size and associated improvement in later regional and global ventricular function ***(Sutton and Sharpe, 2000).***

Primary PCI is the treatment of choice for acute coronary syndrome with ST elevation myocardial infarction; but it is unclear whether it has also benefit on left ventricular function remodeling especially in relation to time delay to primary PCI that may affect patients' morbidity ***(Saeed et al., 2012).***

Typically myocardial infarction allows significant architectural changes in composition, shape, and contractile function of myocardium. Especially left ventricle which is the major contributor to the contractile function of the heart, so it affects the systolic and diastolic functions of the heart ***(Richardson et al., 2015).***

Hospital-based cardiac rehabilitation (CR) programmes are well-established in the effective management of patients with acute coronary syndrome (ACS). These programmes improve survival, quality of life, functional status, and cardiovascular risk profile as well as reduce hospital readmissions and psychological disorders ***(Clark et al., 2005).***

Although CR is an evidence-based form of secondary prevention, referral is suboptimal and participation rates in Australia, the USA, and Europe are low, estimated at 10–30% ***(Scott, 2003)***

Barriers to accessing traditional CR include transport difficulties, work schedules, social commitments, lack of perceived need, and functional impairment ***(Barber et al., 2001).***

Traditional CR faces substantial challenges in terms of cost and access and does not meet the needs of the majority that require secondary prevention or those patient groups most in need of risk factor reduction, such as older adults, women, ethnic groups, and low-income populations ***(Neubeck et al., 2012).***

These challenges have led to the development of a large and diverse array of alternative models of CR including home-based cardiac rehabilitation (HBCR) ***(Redfern et al., 2008).***

AIM OF THE STUDY

Is to evaluate the efficacy of home-based cardiac rehabilitation (HBCR) program on patients presenting with ST elevation myocardial infarction (STEMI) in a comparison with the regular rehabilitation programme.

Chapter 1
ACUTE ST ELEVATION ANTERIOR MYOCARDIAL INFARCTION AND LV REMODELING

Epidemiology

Acute myocardial infarction is the leading cause of death in North America and Europe. Each year an estimated 785000 Americans will suffer a new myocardial infarction, and another 470000 will have a recurrent myocardial infarction. A new myocardial infarction occur every 25 seconds and new case of death from myocardial infarction occur every minute ***(Sutton and Sharpe, 2000).***

Ischemia-reperfusion injury leads to a sequence of events that result in predictable changes to the structure and function of LV that may eventually cause congestive heart disease. Since the advent of primary percutaneous coronary intervention (PCI) to treat AMI, immediate survival has improved; but at the expense of a rising incidence of progressive heart failure (HF) ***(Bogaert et al., 2000).***

ST segment elevation myocardial infarction (STEMI) is the most serious presentation of atherosclerotic coronary artery disease (CAD) carrying the most hazardous consequences ***(Tosteson et al., 1996).***

Definition of Myocardial Infarction:

Universal definition of Myocardial Infarction

The term myocardial infarction (MI) according to European Society of Cardiology is defined as ***(Thygesen et al., 2012):***

- Detection of a rise and/or fall of cardiac biomarker values [preferably cardiac troponin (cTn)] with at least one value above the 99th percentile upper reference limit (URL) and with at least one of the following:

- Symptoms of ischemia.
- New or presumed new significant ST-segment–T wave (ST–T) changes or new left bundle branch block (LBBB).
- Development of pathological Q waves in the ECG.
- Imaging evidence of new loss of viable myocardium or new regional wall motion abnormality.
- Identification of an intracoronary thrombus by angiography or autopsy.

Definition of Acute Myocardial Infarction

The term acute myocardial infarction (AMI) denotes infarction less than 3-5 days old, when the inflammatory infiltrate is primarily neutrophilic. AMI indicates irreversible myocardial injury resulting in necrosis of a significant portion