Cardiopulmonary Rehabilitation versus Cardiac Rehabilitation in Patients Suffering from Coronary Artery Diseases and Chronic Obstructive Pulmonary Disease

Thesis

Submitted for Partial Fulfillment of M Sc Degree in Chest Diseases

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Karim Hossam El-Din Abdel Fattah Abdel Aziz

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List of Abbreviations

Abb.	Full term
ACS	*Acute coronary syndrome*
ADP	*Adenosine diphospahte*
AAT	*Alpha1-antitrypsin*
AACVPR	*American College of Cardiovascular and Pulmonary Rehabilitation*
ATP	*Adenosine triphosphate*
BMI	*Body mass index*
CABG	*Coronary artery bypass graft*
CR	*Cardiac rehabilitation*
CPET	*Cardiopulmonary exercise testing*
CVD	*Cardiovascular disease*
CAT	*COPD Assessment Test*
COPD	*Chronic obstructive pulmonary disease*
CRP	*C-reactive protein*
CSA	*Cross-sectional area*
DASI	*Duke Activity Status Index*
ECG	*Electrocardiogram*
Echo	*Echocardiography*
ESC	*European society for cardiology*
EASD	*European Association for the Study of Diabetes*
PPARα	*Factor peroxisome proliferator-activated receptor α*
FEV1	*Forced expiratory volum in 1st second*
FVC	*Forced vital capacity*
HbA1c	*Glycated hemoglobin*
GOLD	*Global initiative for chronic obstructive lung disease*
HDL	*High density lipoprotine*
HRQL	*Health-Related Quality of Life*
HRR	*Heart Rate Reserve*
HDL	*High density lipoprotein*
HRCT	*High-resolution CT*

List of Abbreviations cont...

Abb.	Full term
HR	*Heart rate*
HRQL	*Health-Related Quality of Life*
IGF	*Insulin-like growth, acidosis. Ub = ubiquitin;*
IGFR	*Insulin-like growth factor receptor;*
IMT	*Inspiratory muscle training*
GDMT	*Guideline directed medical treatment*
ISWT	*Incremental shuttle walk test*
IGF-I	*Insulin-like growth factor-I*
IFN-γ	*Interferon gamma*
IL-1, IL-6, IL-8	*Interleukins*
Camp	*Intracellular cyclic adenosine monophosphate*
ICA	*Invasive coronary angiography*
IHD	*Ischemic Heart Disease*
LBBB	*Left bundle branch block*
LVH	*Left ventricular hypertrophy*
LDL	*Low density lipoprotein*
MMP-6, MMP-9	*Matrix-metalloproteinases*
METs	*Metabolic equivilants of threshold*
MHC	*Myosin heavy chain;*
MI	*Myocardial infarction*
Mph	*Meter per hour*
NMES	*Neuromuscular electrical stimulation*
NF-κB	*Nuclear factor κB*
NIV	*Noninvasive ventilation*
NSTE-ACS	*Non-ST-elevation acute coronary syndrome*
NSTEMI	*Non ST segment elevation myocardial infarction*
NF-κB	*Nuclear factor-kappa B*
OMT	*Optimal medical therapy*
PCI	*Percutaneous coronary interventiom*

List of Abbreviations cont...

Abb.	Full term
VO_2	*Peak oxygen consumption*
QoL	*Quality of life*
RPE	*Rate of Perceived Exertion*
ROS	*Reactive oxygen species*
RBBB	*Right bundle branch block*
6MWT	*Six minute walk test*
SGRQ	*St. George's Respiratory Questionnaire*
SCAD	*Stable coronary artery disease*
STEMI	*ST segment elevation myocardial infarction*
TRH	*Target Heart Rate*
99mTc	*Technetium-99m*
TNF	*Tumor necrosis factor;*
TNFR I and II	*Tumor necrosis factor receptor I and II.*
TC	*Total cholesterol*
TNF-α	*Tumor necrosis factor alpha*
Ub	*Ubiquitin*
UA	*Unstable angina*
WHO	*World health organization*

Abstract

Coronary artery disease (CAD) is one of the leading causes of mortality in COPD cases. Smoking undoubtedly, it is significantly related to causation of chronic bronchitis and emphysema and also is a major risk factor for CAD. In Egypt majority of deaths result from ischemic heart attacks and other cardiovascular diseases, and respiratory diseases caused by tobacco.

Cardiac rehabilitation is recommended according to the ESC as it is associated with a reduction in morbidity. It includes a systematic approach to the measurement and treatment of coronary risk factors, along with the better-known exercise training component and nutritional.

In this prospective study randomized case-control study which was conducted at a sample of 40 patients collected randomly from Ain shams university hospitals (outpatient clinic). Patients were assessed by clinical examination, ECG, ECHO, spirometry, SGRQ and modified Bruce protocol then they were divided into 2 groups: group 1 (cardiac rehabilitation) and group 2 (cardiopulmonary rehabilitation). Patients were subjected to 8-12 weeks of rehabilitation and reassessed by spirometry, modified Bruce protocol and SGRQ.

Both groups improved as regard spirometry (FEV1 & FEV1/FVC), SGRQ and METs but there was there statistical significant improvement as regard resting heart rate in cardiopulmonary rehabilitation group.

Keywords: *Unstable angina – Right bundle branch block - Myosin heavy chain - Insulin-like growth factor receptor*

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is common treatable and preventable chronic disease characterized by persistent and progressive airflow limitation caused by increase airway and lung inflammatory response to noxious particles and gases. The main risk factor for COPD is tobacco smoking; other risk factors include outdoor, occupational and indoor air way pollution ***(GOLD, 2017).***

COPD is a major cause of mortality, morbidity and significant cost to health systems. The projection for 2020 indicates that COPD will be the third leading cause of death worldwide (from sixth in 1990). Although COPD is a preventable and treatable chronic disease, but is frequently under diagnosed and under-treated in clinical practice ***(Raherison and Girodet, 2009).***

Diagnosis of COPD depends on symptoms, history of exposure, family history of COPD and Spirometer. Symptoms of COPD include: dyspnea; progressive and persistent, chronic cough which may be intermittent and not productive, chronic sputum production and attacks of exacerbation (acute worsening of the symptoms) COPD is classified according to severity of symptoms, spirometry and assessment of comorbidity into classes A,B,C and D ***(GOLD, 2017).***

Pulmonary rehabilitation is a broad therapeutic concept. It is defined by the American Thoracic Society and the

European Respiratory Society as a comprehensive intervention based on a thorough patient assessment followed by patient tailored therapies that include, but are not limited to, exercise training and behavior change, designed to improve the physical and psychological condition of people with chronic respiratory disease and to promote the long-term adherence to health-enhancing behaviors ***(ACCP/AACVPR evidence based guidelines. Chest 1997)*** and it is recommended in the management of all classes of COPD according to ***GOLD (2017).***

Coronary Artery Disease also known as Ischemic Heart Disease is a group of diseases that include: stable angina pectoris, unstable angina pectoris, or an MI. Stable coronary artery disease (SCAD) is defined as an established pattern of angina pectoris, a history of myocardial infarction (MI), or the presence of plaque documented by catheterization ***(Lloyd-Jones et al., 2009).***

Difference between stable and unstable angina (UA) is that the latter significantly increases the risk of an acute coronary event in the short term. The characteristics of UA have been described in the recent ESC Guidelines for the management of ACS in patients presenting without persistent ST-segment elevation.

Myocardial infarction (MI) is defined as detection of rise/or fall of cardiac biomarker values with at least one value

above the 99th percentile of upper reference limit and with at least one of the following: Symptoms of ischemia, New or presumable new significant ST-T changes or new LBBB, Development of pathological Q waves in the ECG, Imaging evidence of new loss of viable myocardium, identification of an intracoronary thrombus by angiography or autopsy. Based on ECG it is differentiated into 2 groups STEMI and NSTE.

Atherosclerotic cardiovascular disease (CVD) is now the leading cause of death worldwide, it is on the rise and has become a true pandemic that respects no borders ***(Lloyd-Jones et al., 2009***). CVD was responsible for 42% of all deaths below 75 years of age in European women and for 38% of all deaths at 75 years in men ***(Hamm et al., 2016)***. Risk factors for CAD include Smoking, hypertension, abnormal cholesterol and high triglycerides, Obesity and Lack of physical activity ***(Campeau et al., 1976).*** There is overwhelming evidence that comprehensive cardiac rehabilitation (CR) is associated with a reduction in both cardiac mortality (26–36%) and total mortality (13–26%). (European cardiovascular disease statistics; 2008)

Coronary artery disease (CAD) is one of the leading causes of mortality in COPD cases. Smoking undoubtedly, it is significantly related to causation of chronic bronchitis and emphysema and also is a major risk factor for CAD. In Egypt majority of deaths result from ischemic heart attacks and other cardiovascular diseases, and respiratory diseases caused by tobacco.