

# Pulmonary Rehabilitation in Patients with COPD

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**Abstract:** Shortness of breath associated with cardiorespiratory abnormalities and peripheral muscle discomfort are the major factors that limit exercise capacity in patients with chronic obstructive pulmonary disease (COPD) and those with congestive heart failure (CHF). Both of these symptoms negatively impact on patients' daily physical activity levels. In turn, poor daily physical activity is commonly associated with increased rates of morbidity and mortality. Among those coronary artery disease patients referred, CR completion is associated with improved survival and decreased hospitalization. This is a prospective study of patient who underwent cardiac and pulmonary surgery at university hospital centre "Mother Theresa" in Tirana, Albania over the period 2012-2014. Patients were evaluated before and after cardiac rehabilitation (CR). Tailored pulmonary rehabilitation programs should be considered for COPD patients of all stages, who have respiratory symptoms and/or who have intolerance to physical effort despite optimal pharmacological treatment.

**Keywords:** cardio-pulmonary rehabilitation, exercise capacity, program

## 1. Introduction

Globally, the prevalence of coronary heart disease and heart failure is increasing, and there is some evidence of the health benefits of cardiac rehabilitation. Effective implementation of cardiac rehabilitation after acute coronary syndrome, coronary revascularisation, and heart failure has remained suboptimal, with overall participation rates <50% over recent decades despite international recommendations (1). International guidelines now recommend that cardiac rehabilitation programmes include health education and psychological counseling. Patients should be offered a choice of community based and home based cardiac rehabilitation programmes to fit their needs and preferences (2,3). Clinicians should endorse cardiac rehabilitation for patients with a recent diagnosis of coronary heart disease or heart failure. Cardiac rehabilitation (rehab) is a medically supervised program that helps improve the health and well-being of people who have heart problems. Rehab programs include exercise training, education on heart healthy living, and counseling to reduce stress and help you return to an active life (4). Cardiac rehab can help patients recover after a heart attack or heart surgery; prevent future hospital stays, heart problems, and death related to heart problems; address risk factors that can lead to coronary heart disease and other heart problems (5,6). These risk factors include high blood pressure, high blood cholesterol, overweight or obesity, diabetes, smoking, lack of physical activity, and depression and other emotional health concerns. Adopt healthy lifestyle changes (7). These changes may include following a heart healthy diet, being physically active, and learning how to manage stress. Improve the health and quality of life. The cardiac rehab program should be designed to meet patient's needs. Cardiac rehab involves a long-term commitment from the patient and a team of health care providers. The cardiac rehab team may include doctors (such as a family doctor, a heart specialist, and a surgeon), nurses, exercise specialists, physical and occupational therapists, dietitians or nutritionists, and psychologists or other mental health specialists. Sometimes a case manager will help track patient's care (8,9). Working with the team is an important part of cardiac rehab. Patients should share questions and concerns with the team which help you reach their goals. People of all ages can benefit from cardiac rehab. The

lifestyle changes made during rehab have few risks. These changes can improve the overall health and prevent future heart problems and even death. While the benefits of participation in a cardiopulmonary exercise programme are important in patients with COPD or CHF, these benefits are reversible and can be attenuated few weeks after completion of the rehabilitation programme. Furthermore, hospital-based programmes are generally resource demanding and are limited by low adherence rates.

## 2. Material and Methods

This is a prospective study of patient who underwent cardiac and pulmonary surgery at university hospital centre "Mother Theresa" in Tirana, Albania over the period 2012-2014. Patients were evaluated before and after cardiac rehabilitation (CR).

## 3. Results and Discussion

At baseline, body mass index (26.0+/-3.9 vs. 27.8+/-4.2 kg/m<sup>2</sup>, p<0.01), triglycerides (141+/-55 vs. 178+/-105 mg/dl, p<0.01) and estimated metabolic equivalents (METs) (5.6+/-1.6 vs. 7.7+/- 3.0, p<0.01) were lower and high density lipoprotein cholesterol was greater (40.4 +/- 12.1 vs. 37.5 +/-10.4 mg/dl, p<0.05) in the elderly than in younger patients (table 1). After rehabilitation, the elderly demonstrated significant improvements in METs (5.6+/-1.6 vs. 7.5+/-2.3, p<0.01), body mass index (26.0+/-3.9 vs. 25.6+/-3.8 kg/m<sup>2</sup>, p <0.01), percent body fat (24.4+/-7.0 vs. 22.9+/-7.2%, p<0.01), high density lipoprotein cholesterol (40.4+/-12.1 vs. 43.0 +/- 11.4 mg/dl, p < 0.001) and the ratio of low density to high density lipoprotein cholesterol (3.6 +/- 1.3 vs. 3.3 +/-1.0, p<0.01) and a decrease in triglycerides that approached statistical significance (141 +/- 55 vs. 130 +/-76 mg/dl, p =0.1) but not in total cholesterol or low density lipoprotein cholesterol. Improvements in functional capacity, percent body fat and body mass index, as well as lipids, were statistically similar in the older and younger patients. Prior studies have suggested that CR is associated with better outcomes in CAD patients, and the trials among these prior studies suggest that CR itself produces benefits. In this study, we extend findings of prior studies. This

finding is consistent with several short-term (10) and medium-term studies (11-13). CR takes a multimodality approach in helping patients manage their disease, (14) and it is difficult to pinpoint which part is most vital to the clinical impact, especially given that most CR programs are short term. Target-driven CAD risk factor management is likely a piece of the puzzle, and it is also likely that the education participants receive concerning medication and exercise increases long-term adherence to these therapies. The positive impact of CR on both patient and health system outcomes is sizeable. In the context of such notable CR benefits, the attendance rate of <50% seen in this study and even lower rates in other studies (15) are concerning findings. As part of developing the propensity model, we determined a number of significant predictors of CR completion among our referred population. Men and younger subjects are more likely to complete CR than women and the elderly. The association between CR completion and decreased resource use is an important clinical consideration and a novel finding. Previously, rates of hospitalization in CR patients had been assessed only in congestive heart failure patients, in whom hospitalization was reduced (16-18). Additionally, subjects who start but do not complete CR deserve attention and further assessment. Subjects who do not complete the program are perhaps especially high risk because they are more likely to be rehospitalized and to visit the emergence department. They warrant close follow-up, and further study is required to characterize who is most at risk for noncompletion at the time of CR enrollment.

#### 4. Conclusion

Tailored pulmonary rehabilitation programs should be considered for COPD patients of all stages, who have respiratory symptoms and/or who have intolerance to physical effort despite optimal pharmacological treatment. PR has certainly been demonstrated to provide beneficial effects on dyspnea, improvement in muscle strength and endurance, improvement of psychological status, reduction of hospital admissions, and improvement of HRQoL in COPD patients, with a gradual increase in daily physical activity and autonomy. Successful PR therefore requires behavioral changes. To achieve this, patients' skill and adherence may be facilitated if they are enrolled in longer, comprehensive programs comprising interactions with a multidisciplinary team offering support, council, encouragement, and coaching. These changes rest on the following: exercise training; psychosocial support; nutritional intervention; self-management; and education, as well as pacing and energy conservation strategies, all of which are intended for motivated COPD patients. Therefore, PR embodies a very important and safe therapeutic option that aims to reverse the systemic manifestations of COPD and which, along with pharmacological therapy, can be used to obtain optimal patient management, leading to a favorable change in the daily life of our COPD patients. Accordingly, with the increasing burden of COPD patients in the world, there is an urgent need for advocacy with the concerned authorities, for a more widespread reimbursement of PR programs worldwide.

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**Table 1:** Baseline characteristics of younger versus elderly patients

<i>Variables</i>	<i>Younger patients</i>	<i>Elderly patients</i>	<i>P</i>
BMI	27.8 ( 4.2)	26(3.9)	p<0.01
Triglycerides	178 ( 105)	141( 55)	p<0.01
MET	7.7 (3.0)	5.6 ( 1.6)	p<0.01
HDL	37.5 (10.4)	40.4 ( 12.1)	p<0.05

**Table 2:** Characteristics of younger versus elderly patients before and after CR

<i>Variables</i>	<i>Before CR</i>	<i>After CR</i>	<i>P</i>
BMI	26.0 ( 3.9)	25.6 ( 3.8)	p<0.01
Triglycerides	141 (55)	130 (76)	p = 0.1
METs	7.5 ( 2.3)	5.6 ( 1.6)	p<0.01
HDL	40.4 (12.1)	43.0 ( 11.4)	p<0.01
Body fat	24.4 ( 7.0)	22.9 ( 7.2)	p<0.01
LDL/HDL ratio	3.6 (1.3)	3.3 ( 1.0)	p<0.01