Comparison of Functional Capacity using Primary Percutaneous Coronary Intervention with Pharmacological Therapy on ST Elevation Acute Coronary Syndrome Patients

Andini Nurkusuma Wardhani,[1] Chaerul Achmad,[2] Sunaryo B. Sastradimaja[3]
[1]Faculty of Medicine Universitas Padjadjaran, [2]Department of Cardiology and Vascular Medicine Faculty of Medicine Universitas Padjadjaran, [3]Department of Physical Medicine and Rehabilitation, Faculty of Medicine, Universitas Padjadjaran/Dr. Hasan Sadikin General Hospital Bandung

Abstract

Background: Acute Coronary Syndrome (ACS) is a shift manifestations pattern of ischemic myocardium. Revascularization either with Primary Percutaneous Coronary Intervention (PCI) or pharmacological therapy is an optional treatment for ST Elevation Acute Coronary Syndrome (STEACS) patients. The aim of the study was to compare the functional capacity using six-minute walking test on STEACS patients who underwent Primary PCI or pharmacological therapy.

Methods: A cross sectional study was conducted from September to October 2012 to 35 STEACS patients who were treated after two years. The samples were obtained from the list of patients at Dr. Hasan Sadikin General Hospital. Inclusion criteria consisted of patients diagnosed as STEACS, cooperative and not experiencing cognitive disturbance. The exclusion criteria were STEACS patients with unstable angina or myocardial infarct in the last month, stable exertional angina, and pregnant women. The patients underwent 6 minutes walking test,VO2max was measured using theCalahin and Cooper formula, then Metabolic Equation Task (METs) was calculated. Data were analyzed by unpaired T-test.

Results: There were 19 Primary PCI and 16 pharmacological therapy patients. The average of age between thetwo groups was distributed evenly. Most of the STEACS patients were male, had a college/academic degree and were retired. Patients treated with pharmacological therapy had higher average of VO2 max and METs than patients with Primary PCI. There was no significantly differences of METs between those groups (p>0.05)

Conclusions: There were no significantly differences of functional capacity in STEACS patients treated with Primary PCI or Pharmacological therapy. [**AMJ**.2015;2(1):162–6]

Keywords: Functional capacity, Primary Percutaneous Coronary Intervention, six minute walking test, ST Elevation Acute Coronary Syndrome

Introduction

Cardiovascular diseases (CVDs) are the number one cause of death globally.[1] The World Health Organization (WHO) has predicted that by the year 2030, approximatelly 23–24 million people will die from CVDs.[1,2] Coronary Heart Disease (CHD) is one of cardiovascular disease in which there is an imbalance between the supply and demand of the myocardium, and the most common reason for this is caused by atherosclerosis on the coronary arteries.[3] The CHD itself has been the 5th out of 10 main causes of death in Indonesia with a percentage of 26.7%.[2] Acute Coronary Syndrome (ACS) is one out of a large group of CHD patients, the shift of manifestations from myocardial ischemic includes the pattern from angina pectoris which then developed into myocardial infarction accompanied by a spreading, sharp, sudden appearance chest pain with long duration (of about 10 minutes).[4] Myocardial infarction needs an accurate procedure which is to reopen the tracts of the coronary vessels which are blocked by thrombosis and atherosclerosis, so that the myocardium can be handled before necrosis started to develop. These can be done via pharmacological therapies using fibrinolytic drugs to lyse the obstructing intra-coronary thrombus, so that the circulation can be normalized and limits the spread of the myocardial damage. An alternative procedure

Correspondence: Andini Nurkusuma Wardhani, Faculty of Medicine, Universitas Padjadjaran, Jalan Raya Bandung-Sumedang Km.21, Jatinangor, Sumedang, Indonesia, Phone: +6285697571125 Email: dhiniwardhani30@hotmail.com

other than fibrinolytic is revascularization through percutaneous coronary intervention on the infarct-causing lesions which is referred as Primary Percutaneous Coronary Intervention (Primary PCI).[4] A medical evaluation on ACS patients is important to determine the stability of the patient's conditions. This medical evaluation can be formed in an examination of the patient's condition interview (to gain subjective information), direct measurement upon physical capacity (objectively through measuring strength, motility, sensation, coordination, balance, functional mobility, as well as cardiovascular capacity), diagnostic test, and functional capacity evaluation (including physical and workload capacity).[5]

The aim of the study was to compare the functional capacity using a six- minute walking test on ST Elevation Acute Coronary Syndrome (STEACS) patients who underwent Primary PCI or pharmacological therapy.

Methods

A cross sectional study was conducted to 35 STEACS patients who were treated after two years. The samples were obtained from the list of patients at Dr. Hasan Sadikin General Hospital. Inclusion criteria consisted of patients diagnosed as STEACS, who were cooperative and not experiencing cognitive disturbance so that they were able to go through the 6-minute walking test (6MWT), and agreed to participate in the research. The exclusion criteria were STEACS patients with absolute contraindication for the 6MWT, which were unstable angina or myocardial infarct in the last month, stable exertional angina, and pregnant women. Next, the patient's functional capacity was measured employing the 6MWT. The 6MWT is an examination aimed to measure the maximal or submaximal capacity to know the fitness level or aerobic capability of a person using height, weight, age, and gender as well as length of the track as the predictor factors.[6,7]

Steps of the 6MWT performed were: (1) the subject rested for a while when the subject was examined for contraindications, pulse rate, blood pressure, and levels of dyspnea with the Borg Scale which was felt by the subject before examination, (2) the timer was set on to 6 minutes, the subject was then positioned at starting point, and the timer was started whenever the subject was ready, (3) after 6 minutes, the subject was asked to stop, and

had their pulse rate and degree of dyspnea examined using the Borg scale for the second time, (4) observed the amount of laps which had been undergone, and the total distance which had been taken, and then recording them in the 6MWT worksheet.[6]

From the result of 6MWT, the VO2max of each subject was measured using the Calahin and Cooper formula[8,9] Functional capacity was described using the Metabolic Equation Task (METs)[8,9]

Characteristics of the respondents were classified according to age, gender, educational status, occupation, weigh, height, and Body Mass Index (BMI). This research was approved by the Health Research Ethics Committee of the Faculty of Medicine, Universitas Padjadjaran and was conducted from September to October 2012. The data were tested for their normality using Shapiro-Wilk test and analyzed by unpaired T-test.

Results

Out of sixty-five subjects from the patients list, only 35 patients could be followed up during the study. The distribution of patients were 19 Primary PCI patients and 16 pharmacological therapy patients (Table 1).

The average of age between the two groups was distributed evenly. Most of the STEACS patients were male, had a college/academic degree and were retired. The two groups had similar average of BMI and walking distance (Table 1).

The average of VO2 max measured by Cooper formula was higher than by Cahalin formula in both groups. Moreover, patients treated with pharmacological therapy had higher average of VO2 max than patients with Primary PCI (Table 2).

Metabolic Equivalent Tasks (METs) as one of the indicators of functional capacity was measured by dividing VO2 max with 3.5 for male and 2.7 for female (Table 3).

This study showed that the result of average of METs in the two groups was similar to the result of the average of VO2max. Patients treated with pharmacological therapy had higher average of METs than patients with Primary PCI using either the Cahalin or Cooper formula. The result of the statistical analysis using unpaired T-test, showed that there was no significantly differences of METs between those groups ($p > 0.05$)

Table 1 Characteristics of patients with STEACS

Characteristics	Intervention	
	Primary PCI (n=19)	**Pharmacological Therapy (n=16)**
Age (years old)		
≤ 57	4	5
58–60	6	3
61–64	4	5
≥65	5	3
Average Age (standard deviation)	61.47 (7.81)	60.62 (6.23)
Gender		
Male	13	11
Female	6	5
Education		
College/Academy	12	4
High School/Junior High	6	9
Elementary School/None	1	3
Occupation		
Public Servant	4	1
Private	5	3
Household	1	1
Labor	0	2
Retired	9	9
Average Weight (kgBW)	60.95 (8.85)	65.62 (11.99)
Average Height (cm)	158.58 (6.34)	162.19 (7.46)
Average BMI	24.24 (3.39)	24.94 (4.11)
Average Walk Distance of the Subjects (meter)	323.37 (77.59)	333.88 (57.65)

Discussions

The ACS is more common in male than female. Men are more afflicted with ACS attacks compared to women.[10-13] The similarcondition was also found in this study. Other characteristics of subject in the study was the subject were dominated by patients with age over 57 years. This is inaccordance with the Framingham Heart Study in Morrow12 which shows that the prevalence of ACS is highest at the age of over 40 years old.

In this study the walking distance of 6MWT of STEACS patients managed with Primary PCI had an average of 323 meter or 66% of the predicted value of a healthy person. While those with pharmacological therapy in this research had an average of 334 meter or 65% of the predicted value of a healthy

Table 2 Average of VO2max (ml/kg/minute)

Formula	VO2max (ml/kg/minute)Primary PCI (n=19)	Pharmacological Therapy (n=16)
Cahalin	13.68 (2.33)	13.99 (1.73)
Cooper	19.08 (5.12)	20.04 (3.90)

Table 3 Average of Metabolic Equivalent Tasks (METs)

Formulas	Primary PCI (n=19)	Pharmacological Therapy (n=16)	p value
Cahalin	4.20 (0.47)	4.32 (0.43)	>0.05
Cooper	5.81 (1.19)	6.15 (0.88)	

person. According to a study performed by Nirwan[11] on post-Primary PCI ACS patients, the average is 358 m or 70% of the predicted value of a healthy person. The result of average distance of 6MWT in this research was not much different from those of Nirwan's study. The percentage of the predicted value of a healthy person on Primary PCI is higher than the pharmacological therapy is caused by age, height, and weight of various subjects that being an important predictor in the prediction of standard calculation of 6MWT by Enright's formula.[14]

Furthermore, functional capacity is the ability of a person to do his daily activity in accordance with his function.[15] Functional capacity is often served in the form of METs (Metabolic Equivalents).[16] METs can be defined as the use of maximal oxygen (VO2 max) in mL/kg/minute, the formula of one METs is the same as the oxygen needed at resting seated position, equals to 3.5 mL/kg/minute for men, and 2.7 mL/kg/minute for women.[8,9,14] This study showed that there was no significant difference of METs between patients treated by pharmacological therapy and Primary PCI. This finding is in accordance with a previous study performed by Pilote et al.[17] , comparing the quality of life on STEACS patients, with Physical Component Status (PCS) which consists of Physical Function, Role Limitation Due to Physical Health, and Body Pain[10], who found that both groups were not significantly different in regard of their quality of life on much of the PCS components. This result occured because of the functional capacity after an event of ACS is significantly affected by the ability of the patient to follow his daily activity.[17]

Conclusively, there was no significantly differences of functional capacity in STEACS patients treated with Primary PCI or Pharmacological therapy.

This study had limitations, there is a need to use alarger sample and complete information concluded in themedical records. In this study, only 35 out of 65 patients could participate because of the lack of information about the patient's identity, complete address with RT/ RW, regency, and district, and also phone numbers. To gain a better score on the 6MWT, learning or training effect is needed to let the patients adapt to the test because the learning effect can influence the psychological aspect of the subject against the fear of chest pain and also affect their motivation.14,15,19-20 A standardized and same track are needed to obtain optimal comparison of distance and functional capacity from 6MWT6.

A further study should be conducted using 6MWT several times to measure the improvement of functional capacity time to time.

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