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Original Research

Simple Risk Stratification based on Killip Classification and the Six-minute Walk Test Borg Scale for Outcomes of Acute Coronary Syndrome for Papuanese People in Rural Hospital

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ABSTRACT

Background: Accurate risk stratification for untoward outcomes after acute coronary syndrome patients may help clinicians guide the type and intensity of therapy. Unfortunately, most of the Papuanese people face difficulties in accessing sophisticated medical treatment. **Aims:** The aim of this study was to determine the simplest but most accurate risk stratification for ACS patients treated in rural hospital. **Methods:** This was a cross-sectional study conducted in Sele Be Solu Regional Hospital at Sorong Regency in West Papua Province. Fifteen unselected patients from September 2019 to March 2020 period with ACS were prospectively studied. All the data were collected from medical records. **Results:** Subject characteristics mostly were male (80%) and mean age was 54 years, (13,3%) subjects were age less than 45 years. The most diagnosed ACS type was STEMI (73,3%). **Conclusion:** In Papuanese patients with ACS in rural hospital, those at highest risk can be identified using Killip classification and The Six-minute Walk Test Borg Scale as short term predictor for ACS patients' outcome.

Introduction

According to World Health Organization, cardiovascular diseases are the world's deadliest disease with 17, 9 million deaths annually [1]. Acute coronary syndrome (ACS) is one of cardiovascular diseases that contributed to 7 million deaths worldwide [2]. ACS is a spectrum of cardiovascular disease caused by sudden blockage or narrowing of the coronary vessels [4,5]. Atherosclerotic plaque rupture is a common mechanism underlying blockage of the coronary vessels in ACS patients [4,5]. Atherosclerosis is inflammation of the artery walls due to lipid buildup. [3,4,5]

ACS spectrum including ST segment elevation myocardial infarction (STEMI), non ST segment elevation myocardial infarction (NSTEMI) and unstable angina pectoris (UAP). The most common clinical manifestation of ACS is heavy chest pain, dyspnea, decrease awareness and loss of consciousness [4,5,6]. The risk factors of ACS are

grouped into modifiable and un-modifiable factors. Modifiable factors are unhealthy sedentary lifestyle, consumption of excess fatty foods and oils, and smoking [5]. The un-modifiable factor is genetic. [5]

The incidence of re-hospitalization and post-discharge mortality is also quite high in ACS patients in the Asia-Pacific region [3]. Most patients develop cardiac decompensation after having ACS [6]. Killip classification was invented in the mid-60s to minimize the risk of mortality for myocardial infarct (MI) patients during their hospitalization [7]. In this modern era, Killip classification is still being used to measure the clinical severity of cardiac decompensation among ACS and MI patients [7,8]. However, many other scientists are proving the usage of Killip classification as a predictor for ACS patients' mortality and morbidity. According to Zadok et al, Killip classification has been shown to be a predictor of 1-year post-discharge cardiovascular function for ACS patients [8]. Study by Mello et al. said the 5-year prognosis for patients with myocardial infarction can be assessed by the Killip classification at the admission. [9]

There is no data available that shows short term predictor factor of Killip classification for ACS patients, so this study was conducted to determine Killip classification as short term predictors of ACS patients' outcome through the six-minute walk test (6MWT) Borg scale in Sele Be Solu Regional Hospital.

Material and Methods

This cross-sectional study was based on medical records of ACS patients in Sele Be Solu Regional Hospital in Sorong who were diagnosed by cardiologists and after undergoing a cardiac rehabilitation program. All patients with ACS (STEMI, NSTEMI and UAP) who were diagnosed and received cardiac rehabilitation during September 2019 to March 2020 were included. Patients with chronic kidney disease, chronic pulmonary disease and heart failure were excluded.

The variables were age, sex, ACS type, Killip Classification and Borg Scale. The Killip classification variable was measured by the cardiologist at the time patients first enrolled in our hospital. The Borg variable was measured using Borg's CR-10 Scale by our medical rehabilitation specialist.

Results

A total of 15 patients with ACS had completed therapy and cardiac rehabilitation program. Males were most likely to had ACS (80%) than females (20%). Age distribution predominantly in adult (≥ 45) (86.7%) than young adults (< 45) (13.3%). The youngest patient who was diagnosed with ACS was 36 years old. The oldest patient who enrolled to the study was 70 years old. The most ACS type was STEMI (73.3%), while NSTEMI and UAP were (13.3%) respectively. The duration of hospitalization varied from 3 to 16 days with a mean stay of 6 days. Almost half of the subjects were not showed any symptoms of cardiac decompensation (Killip I) (46.7%). Meanwhile, the lowest percentage was patients who had Killip III and IV, respectively (13.3%). The Killip class will be grouped into two: (1) Those that didn't have cardiac decompensation (Killip I) and, (2) those who had cardiac decompensation (Killip ≥ II). We classified the Borg scale consisting of 12 sub-units from 0 to 10 (Borg CR10) ® into 2 categories, light-mild (0-4) and heavy (5-10). The purpose of classifying was based on clinical considerations so that it was easy to understand. The Borg scale distribution was almost equal for both categories. Slightly majority of the patients (53.3%) feel the 6MWT was heavy and the rest (47%) was light-mid. The characteristic of the subject is given in Table 1.

Table 1. Baseline characteristic of the subject (N=15)

Characteristics	Number of cases (%)
Sex	
Male	12 (80)
Female	3 (20)
Age (Years old)	
< 45	2 (13,3)
≥ 45	13 (86,7)
Mean	54,13
ACS Type	
STEMI	11 (73,3)
NSTEMI	2 (13,3)
UAP	2 (13,3)
Length of Treatment Time (Days)	
Min-Max	3-16
Mean	5,93
Killip Classification	
Killip I	7 (46,7)
Killip II	4 (26,7)
Killip III	2 (13,3)
Killip IV	2 (13,3)
6MWT Borg Scale	
Light-Mid	7 (47)
Heavy	8 (53)

The study found that (85.7%) subject with Killip I did feel the 6 MWT Borg scale was light-mid and (14.3%) was heavy. Seven patients (87.5%) from those who had clinical symptoms of cardiac decompensation (≥Killip II) feel the 6 MWT Borg scale was heavy, meanwhile (12.5%) feel light-mid. The test result was significant for Killip classification for predicting ACS patients' cardiovascular outcome with 6MWT Borg scale (p=0,01, OR=42, CI 95%=2,1-825,7).

Table 2. Study result using Fisher's exact test

	Borg Scale		*p*	OR (CI 95%)
	Light-Mild n (%)	Heavy n (%)		
Killip Class (n=15)				
Killip I	6 (85,7)	1 (14,3)	0,01	42 (2,1- 825,7)
Killip II + III + IV	1 (12,5)	7 (87,5)		

Discussion

This study showed that (80%) of the subjects were male. This is in accordance with the results of research by Khan et al (2013) which examined gender differences in the clinical presentation of young ACS patients, which found (76.3%) male patients and (23.7%) female patients [10]. The incidence of ACS in the group of subjects aged <45 years was (13.3%) indicating that the current trend of cardiovascular disease events can occur in young adults. Previous research by Anderson et al. (2008) found that 10% of cases of myocardial infarction occurred in the age group <45 years [11]. Other study by Ricci et al (2017) examined the risk of young adult women on the incidence of ACS, obtaining data from 8% of ACS subjects aged <45 years. [12]

Six-minute walk test (6MWT) is a method of measuring the functional ability of a person's cardiovascular and respiration systems through walking for 6 minutes [13,14,15]. The components measured in 6MWT are distance reported in meters or feet, oxygen saturation, blood pressure, heart rate, dyspnea and the patient's fatigue level. The Borg scale is a method used to measure a person's perception of the load of his physical activity [16]. The Borg scale is a numeric range from 0 to 10, which can be interpreted as a level of physical activity from light to heavy [16]. Six-minute walk test and Borg scale measurement are included as components of pre-discharge cardiac training tests for patients with myocardial infarction, ACS, heart failure, post-invasive cardiovascular therapy, and heart or lung transplant [17]. The Borg scale was used to measure ACS patients' cardiovascular function after they did 6MWT.

Theoretically, patients who have decreased cardiorespiratory function tend to experience increased respiratory effort during normal daily physical activities that do not impose a burden on normal people [16,18]. Research by Hamilton et al (1996) proved that decreased cardiorespiratory function had an effect on increased respiratory effort and was associated with patient perceptions of the level of physical activity undertaken [18]. The increasing respiratory effort in patients with cardiorespiratory disorders was measured using the Borg scale and it was found that they tended to be in the heavy category. [18]

The results of bivariate analysis using Fisher's exact test showed significant results for Killip classification in ACS patients. According to the results, Killip classification is a short-term predictor of post-treatment outcome for ACS patients with the 6 MWT Borg scale on the cardiac rehabilitation program as an indicator of cardiorespiratory function (p=0,01). This study found that ACS patients admitted to hospital with ≥Killip II is at high risk for having poor cardiorespiratory function outcome after treatment. Previous research by Zadok et al (2019) concluded that high killip classification (≥Killip II) is associated with an increased mortality rate of ACS patients at 1 year post-discharge [8]. However, a wide CI 95% (2,1-825,7) indicated that the results of the study were less accurate in stating the chance for ACS patients with ≥Killip II experienced worsening post-treatment cardiovascular system function.

The obstacle in this study was the time to collect data at the same time as the COVID-19 pandemic so that the medical rehabilitation clinic did not provide patient care. Thus, no more subjects could be obtained.

Conclusion

From the study we can conclude that most of our subjects were male (80%), with the most ACS type was STEMI (73,3%) and mean age were 54 years. Subjects mostly admitted with the Killip I classification. The Borg scale of post-treatment ACS patients was generally in the moderate category (Borg scale 4). The test result was significant for Killip classification and Borg scale in ACS patients at RSUD Sele Be Solu. Further study about the Killip classification and 6MWT Borg scale is needed for ACS patient with the bigger numbers of sample to get the result that can be generalized.

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There is no conflict of interest.

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