

## The Relationship among Six-minute Walk Test, 12-item Short Form and the World Health Organization Quality of Life Brief in post Coronary Artery Bypass Graft Patients: A Pilot Study

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### Abstract

**Objective:** To determine the quality of life (QOL) and physical capacity of post coronary artery bypass graft (CABG) patients and to investigate the relationship between physical capacity by using six-minute walk test (6MWT) and QOL by using 12-item short form (SF-12) and the world health organization quality of life brief form (WHOQOL-BRIF) in post CABG patients.

**Materials and Methods:** SF-12, WHOQOL-BREF and 6MWT were evaluated before surgery and sixth week after CABG (n=9). Pearson's product-moment correlation was used to evaluate the relationship of parameters, dependent T-test was used to compare QOL and physical capacity before and after surgery.

**Results:** At 4-6 weeks post CABG, average scores of SF-12, WHOQOL-BREF and 6MWD were increase from baseline (SF-12; 62.61±12.00 to 73.21±5.28, WHOQOL-BREF; 96.67±11.50 to 100.89±10.06, 6MWD; 203.26±89.78 to 350.00±124.75 meters). SF-12 and 6MWD, WHOQOL-BREF and 6MWD had fair correlation (r=0.57, r=0.54 respectively).

**Conclusion:** QOL scores and 6MWD were increase after CABG surgery. The relationship of QOL questionnaires and physical capacity were positive fair correlation.

**Keywords:** SF-12, WHOQOL-BREF, Six-minute walk test, Coronary artery bypass graft, Quality of life

### Introduction

The definition of non-communicable diseases (NCDs) or chronic diseases are the diseases that noninfectious or non-transmissible by contact, respiration or secretion. Long duration and generally slow to progression. NCDs including cardiovascular diseases (CVDs), cancers, chronic respiratory disease and diabetes and these diseases are caused by risk factors that involve behavior such as hypertension (HT), hypercholesterolemia, diabetes mellitus (DM), overweight/obesity, smoking, alcohol intake, physical inactivity or stress [1-3]. Cardiovascular diseases are the major problem in Thailand and also worldwide. WHO reported that CVDs are the first cause of death [4]. In Thailand reported that CVDs are top three cause of death in 2011 and 58,681 people have died from these disease or average of 161 people per day [5].

Cardiovascular diseases are disorders of the heart and vascular such as coronary artery disease (CAD). Although, today CVDs can be cured by medicine or surgery. But after surgery most of patients often have physical activities restriction especially patients undergone coronary artery bypass graft (CABG) because of fear or previous experiences. For example, exercise may contribute to chest pain or angina pectoris or dyspnea. Heart surgery is a complex procedure that affects many body systems such as cardiovascular and respiratory systems so the physiological effect of those systems will be worsening. In pre-operative, patients have low physical capacity because their symptoms such as angina pectoris,

dyspnea or arrhythmia. Post-operative may contribute to many limitations including physical capacity restriction. Patients cannot do activity of daily life or work effectively, that make poor financial. Moreover it may effect to the mental health that make poor recovery. Therefore, the physical capacity and quality of life of post CABG patients may be decrease [6-9].

Physical capacity is the power to produce, perform or deploy with the body. Activity of daily life is walking and it can be assessed by several tests such as six-minute walk test (6MWT). 6MWT is common use in patients undergoing coronary artery bypass graft. This test is easily, inexpensively, safety and reflex to activity of daily living (ADL)( $r=0.78$ )[10-11].

Pre-operative period, some patients cannot assess the physical capacity by 6MWT because they have any contraindications. If we have something to measure physical capacity instead 6MWT such as the questionnaires. So we can measure the physical capacity in this group. Post-operative period, most patients improve in QOL. But which questionnaire is sensitive for detect the physical capacity. The researcher is interested in SF-12 and WHOQOL-BREF because they have cost effectiveness and less study in CAD patients. So in this study will use SF-12 and WHOQOL-BREF for evaluate because they are shortly, easy to use, save time, appropriate in large population and reliability and validity are high [12-13].

So the researcher is interest to study about the relationship between the physical capacity and questionnaires of quality of life and which questionnaire is sensitive for detect the change of physical capacity. If they have good relationship and good sensitivity, the questionnaire will be used to evaluate the physical capacity in patients who have contraindication for 6MWT.

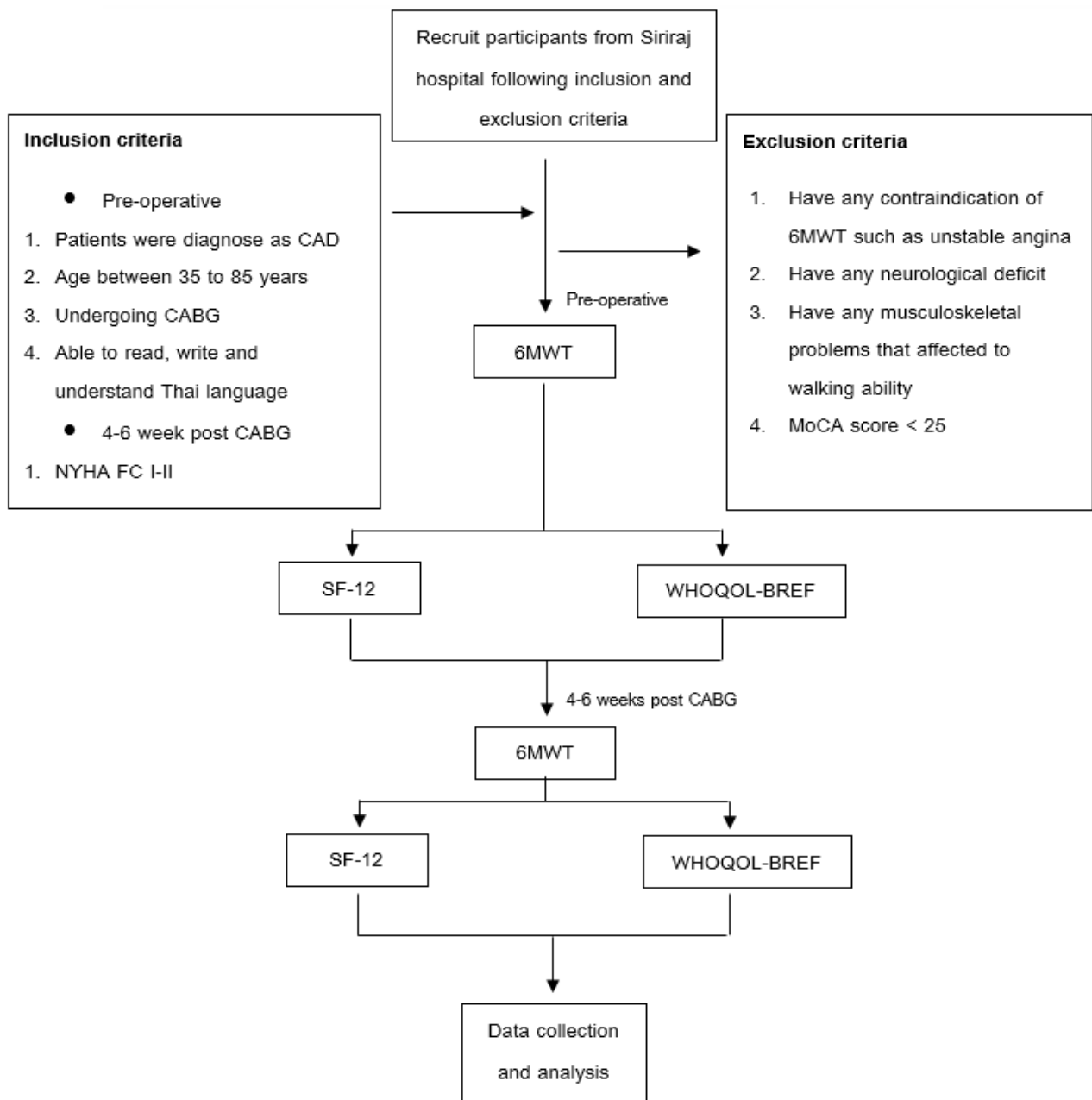
## Materials and Methods

The study is a cross-sectional study design. There has 9 participants. There are the patients who admit to the cardiac ward (pre-operative) of Siriraj hospital for CABG surgery and patients in phase II of cardiac rehabilitation (4-6 weeks post-operative), aged between 35 to 85 years, able to read, write and understand in Thai language and physical activity level of phase II patients in the New York Heart Association Functional Classification (NYHA Fc) I-II. Who had contraindication of 6MWT, neurological deficit, musculoskeletal problems that affected to walking ability or mild cognitive impairment (MCI) screening by MoCA (scores < 25) were exclude.

QOL was evaluated by 12-Item Short Form (SF-12) and the World Health Organization quality of life brief form (WHOQOL-BREF) Thai version. They was shortly, easy to use, save time, appropriate in large population, reliability and validity are high [13-14].

Physical capacity was evaluated by 6MWT. Before test, blood pressure (BP), RPE of dyspnea and fatigue, heart rate (HR) and oxygen saturation were recorded. Test period, the patients walked along the hallway in 6 minutes as far as possible. They can wear shoes and stop whenever they want or have symptoms such as fatigue, dyspnea or headache.

The data was collect 2 times (pre-operative, 4-6 weeks post CABG). In pre-operative period, the participants was recorded demographic data (age, gender, weight, height, body mass index, occupation, education, risk factors of CAD and medications intake) by themselves with supervisor. Next, the participants was perform 6MWT. When 6MWT finished, the participants must rest at least 10 minute before go to next tests. They was random the questionnaires by draw lots (SF-12 and WHOQOL-BREF). If they are finish the first questionnaire, they will rest for 5 minutes and do the next questionnaire both pre-operative and 4-6 weeks post CABG. All of the tests will finish in same day (figure1).



**Figure1** Process of the study.

The data was analyzed by Statistical Package for Social Science (SPSS) software 22 for window. The level of statistically significant was set up at p-value less than 0.05 ( $p < 0.05$ ). Descriptive statistic was used to analyze demographic data. Kolmogorov Smirnov Goodness of Fit test was used to test normal distribution. Dependent T-test was used to compare QOL and physical capacity before and after surgery, Pearson's product-moment correlation was used to evaluate the relationship of parameters. The coefficient values were classified as good to excellent ( $r > 0.75$ ) moderate to good ( $0.50 \leq r < 0.75$ ), fair ( $0.25 \leq r < 0.50$ ) and little or no ( $0.00 \leq r < 0.25$ ) relationship.

## Results and Discussion

This study had 9 participants, all men. Subject characteristics were showed in Table1. The average scores of QOL (SF-12 and WHOQOL-BREF) and 6MWD were showed in Table2. At pre-operative and 4-6 weeks post CABG, QOL scores of SF-12 and WHOQOL-BREF were in good range (good range score of SF-12 is above 50 and WHOQOL-BREF is above 96) (SF-12 mean±SD = 62.61±12.00, 73.21±5.28 WHOQOL-BREF: mean±SD = 96.67±11.50, 100.89±10.06 respectively). 6MWD had increase from 203.26±89.78 to 350.00±124.75 meters. Increasing of 6MWD more than 50 meters after surgery had a clinically significant improvement following the cardiac rehabilitation guidelines by the American Thoracic Society in 2002. Both QOL scores and 6MWD were increase from baseline due to the surgery relieved symptoms of CAD such as chest pain or dyspnea that effected to activities limitation. Therefore, patients can do everything by themselves including activities of daily life (ADLs), walking ability and return to work. Same with study of Rumsfeld et al. in 2001 [15]. They found at pre-operative patients had low QOL. Then after the surgery, QOL scores had increase because angina pectoris was decrease. Angina is the most important thing effected to QOL and low QOL effected to increase re-hospitalization, morbidity and mortality. Staniute et al. in 2014 [16] found impaired QOL was associated with reduced physical capacity.

**Table 1** Subject Characteristics.

Characteristics	mean±SD	Minimum	Maximum
Sex			
Male (n)	9 (100%)		
Female (n)	0 (0%)		
Age (year)	66±9.26	52	76
Weight (kilogram)	66.57±14.02	51.40	97.00
Height (centimeter)	167±8.56	156	178
Body mass index (kilogram/meter <sup>2</sup> )	23.87	19.11	33.96

**Table 2** SF-12, WHOQOL-BREF scores and 6MWD at pre-operative and 4-6 weeks post CABG.

Data	mean±SD	Minimum	Maximum
SF-12 pre-operative	62.61±12.00	50	89.29
WHOQOL-BREF pre-operative	96.67±11.50	87	124
6MWD pre-operative	203.26±89.78	93.90	315.80
SF-12 4-6 weeks post CABG	73.21±5.28	64.29	82.14
WHOQOL-BREF 4-6 weeks post CABG	100.89±10.06	86	115
6MWD 4-6 weeks post CABG	350.00±124.75	100	510

**Table 3** Correlation of SF-12, WHOQOL-BREF and 6MWD at pre-operative period.

Data	WHOQOL-BREF		6MWD	
	r	p-value	r	p-value
SF-12	0.81*	0.008	0.18	0.64
WHOQOL-BREF	1		0.452	0.22

\* = significant at p-value <0.05

**Table 4** Correlation of SF-12, WHOQOL-BREF and 6MWD at 4-6 weeks post CABG.

Data	WHOQOL-BREF		6MWD	
	r	p-value	r	p-value
SF-12	0.50	0.17	0.57	0.11
WHOQOL-BREF	1		0.54	0.13

The correlation between QOL questionnaires and 6-minute walk distances (6MWD) of pre-operative and 4-6 weeks post CABG were showed in table3 and table4 respectively. Table3 found SF-12 and WHOQOL-BREF had good to excellent correlation ( $r=0.81$ ,  $p<0.05$ ). Both questionnaires had similar domains such as physical and emotional domain.

Table4 found at 4-6 week post CABG SF-12 and 6MWD, WHOQOL-BREF and 6MWD had positive fair correlation ( $r=0.57$ ), ( $r=.54$ ) with no statistical significant respectively. This study had less participants and questionnaires had several domains. In addition to physical and emotional domains. There had social and environment domains but QOL scores was an overall questionnaires. This study similar to Kaewkhuntee et al. in 2015 [9], they found physical domain of QOL by using SF-36 and 6MWD had fair correlation ( $r=0.43$ ,  $p<0.05$ ). However this study had a small population. In the future, for good results should collect more data.

### Conclusions

The QOL scores were increase after surgery due to the surgery was relief angina pectoris. Patients return to do ADLs by themselves. So 6MWD was increase. SF-12, WHOQOL-BREF and 6MWD had positive fair correlation. Therefore, SF-12, WHOQOL-BREF and six minute walk test are useful to assess the quality of life and physical capacity of the patient after surgery.

### Ethic Committee No.

This study has approve by center of ethical reinforcement for human research of Mahidol University protocol number MU-CIRB 2017/024.2301

### Acknowledgements

The authors would like to thank the participants, doctors, nurses, physiotherapists and office workers in the Division of Cardiology, Division of Cardio Thoracic Surgery, and Her Majesty's Cardiac Center, Faculty of Medicine Siriraj Hospital, Mahidol University.

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