MedPharmRes

Journal of University of Medicine and Pharmacy at Ho Chi Minh City
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Original article

Quality of life in patients receiving percutaneous coronary intervention and optimal medical therapy in Ho Chi Minh City, Vietnam

Thao Thanh Nguyen[a], Quyen Gia To[b], Anh Do Nguyen[c], Tien The Nguyen[c], Van-Anh Ngoc Huynh[d], Kien Gia To[d*]

[a]*Center for Diseases Control of Ho Chi Minh City;*
[b]*Appleton Institute, Central Queensland University, Australia;*
[c]*Department of Interventional Cardiology, Nhan Dan Gia Dinh Hospital, Ho Chi Minh City, Vietnam;*
[d]*Faculty of Public Health, University of Medicine and Pharmacy at Ho Chi Minh City.*

Received July 23, 2020: Revised August 23, 2020: Accepted September 17, 2020

Abstract: ***Introduction:*** This study assessed Health-Related Quality of Life (HRQOL) of patients with Acute Coronary Syndrome (ACS) 6 to 12 months after receiving Percutaneous Coronary Intervention (PCI) and/or Optimal Medical Therapy (OMT) at a hospital in Ho Chi Minh City, Vietnam. ***Methods:*** A cross-sectional study was conducted on 113 patients. Data on demographic, lifestyle behaviours, and HRQOL were collected using a structured questionnaire through face-to-face interviews. HRQOL was measured using EQ-5D-5L and EQ-VAS. Data on co-morbidity and other clinical characteristics were extracted from hospital records. Bivariate and multivariable linear regression models were run to test the differences in EQ-5D-5L utility index and EQ-VAS scores between PCI/OMT and OMT alone groups. ***Results:*** EQ-5D-5L utility index and EQ-VAS scores were lower in PCI/OMT compared to OMT groups, although the differences were not clinically meaningful. Weight status, smoking, and physical activity were associated with EQ-5D-5L utility index score, whereas only physical activity was associated with EQ-VAS score. ***Conclusion:*** The findings suggested that improving sufficient physical activity levels and stopping smoking after PCI or/and OMT may help increase HRQOL among ACS patients.

Keywords: Acute coronary syndrome; EQ-5D-5L; EQ-VAS; Quality of life; Utility index.

1. INTRODUCTION

Cardiovascular disease (CVD) is a global public health concern with an estimated 17.9 million deaths in 2016, accounting for 31% of all global deaths [1]. It is estimated that 151,377 million disability-adjusted life years was lost due to CVD [2]. CVD is a group of heart and blood vessels disorders, including acute coronary syndromes (ACS) known as a "heart attack" [3]. Approximately 80% of ACS patients die within the first one hour before they are carried to the nearest hospital [3, 4]. Compared to the general population, ACS patients are more likely to have depression and confined mobility, resulting in lower health-related quality of life (HRQOL) [5], a measure of perceived health status and satisfaction in performing daily life activities [6].

Treatments for ACS is vital and should be provided urgently. The guidelines of European Society of Cardiology and European Association for Cardio-Thoracic Surgery recommended an invasive strategy for most of ACS patients [7]. Percutaneous coronary intervention (PCI) is the second most frequently performed invasive intervention for ACS in the U.S after cardiac catheterization in 2019 [8]. In PCI, a flexible thin tube is used to insert a stent into an artery to

*Address correspondence to Kien Gia To at Faculty of Public Health, University of Medicine and Pharmacy at Ho Chi Minh City, Vietnam; E-mail: togiakien@ump.edu.vn
DOI: 10.32895/UMP.MPR.4.4.1

widen plague-build-up-narrowed blood vessels in the heart, an atherosclerosis. This non-surgical intervention is highly successful and causes few complications [7, 8, 9]. Optimal medical therapy (OMT), which includes antiplatelet agents, statins, β-blockers and angiotensin-converting enzyme inhibitors/angiotensin receptor blockers, is an initial and essential treatment that needed for ACS patients whether or not they receive PCI [10, 11].

Previous studies showed that PCI improve HRQOL among ACS patients [12, 13]. There were also few studies on this issue conducted in Vietnam where the population is aging quickly and CVD as the leading cause of deaths is accounting for 30% of total disability-adjusted life years [14, 15]. Although HRQOL is an important measure to assess clinical outcomes [16], data on HRQOL among ACS patients were limited in Vietnam. Therefore, this study was conducted to 1) evaluate HRQOL of ACS patients in Nhan Dan Gia Dinh Hospital, Ho Chi Minh City (HCMC), Vietnam, 2) determine whether HRQOL was different for those receiving both PCI/OMT compared to those receiving OMT alone 6 to 12 months after treatment, and 3) examine associations between HRQOL and potential correlates.

2. MATERIALS AND METHOD

2.1. Study settings

Nhan Dan Gia Dinh Hospital is a public provincial hospital administrated by the Ho Chi Minh City Department of Health. The 1,500-bed hospital with modern-equipment, and experienced and high-skilled healthcare professionals, is capable for 4.000 outpatient-visits and 300 emergencies per day. This is a teaching hospital of the University of Medicine and Pharmacy at Ho Chi Minh City (http://bvndgiadinh.org.vn/home/about/).

2.2. Study designs and participants

A cross-sectional design was used to collect data from ACS patients at the Department of Interventional Cardiology, Nhan Dan Gia Dinh Hospital between March and May 2019. The hospital provided treatment for more than 750 ACS patients in 2018, of which 76% received PCI. A list of patients and their medical records were used to screen for participant's eligibility. Patients who 1) were at least 18 years old; 2) diagnosed with ACS including unstable angina (UA)/non-ST elevation myocardial infarction (NSTEMI) or ST elevation myocardial infarction (STEMI); 3) had coronary angiography; and 4) underwent PCI plus OMT (PCI/OMT) or OMT alone for 6 to 12 months at the hospital. Those who were unable to answer the questions due to limited cognitive ability; had chronic coronary artery disease; or underwent the second invasive strategy were excluded from the study. Eligible patients were invited to participate in the study when they visited the hospital for medical check-up. The purpose of the study was explained, and information sheet was provided to the patients. Patients were required to return written consents if they agreed to participate.

2.3. Data collection

Face-to-face interviews were conducted using a structured questionnaire. Demographic and socio-economic characteristics collected included gender, age, marital status, education level, place of residence, working status, household economic and health insurance. Age was grouped into <65 years or ≥65 years as patients aged ≥65 years suffer higher risk of mortality [11]. Weight and height were measured using standard protocols [17]. Body Mass Index (BMI) calculated by [weight (kg)]/ [height squared (m^2)] was used to determine patients' weight status. A patient was classified as normal weight (BMI<23) and overweight/obese (BMI ≥23) as suggested by World Health Organization for Asian population [18]. Household economic was certified by the local authorities as poor and non-poor.

Lifestyle behaviours, including smoking, drinking alcohol, and being physically active, were self-reported. A patient was considered an active smoker if they smoked within the last 30 days. Non-smokers or those who stopped smoking within the last 30 days were grouped together. Similarly, those who drank at least one standard unit of alcohol per day or five units within the last 30 days were considered a drinker. In addition, a patient was considered active if they self-reported engaging in at least 30 minutes of moderate-vigorous physical activity in at least 5 days/week and within the last 30 days. These simple questions, adapted from STEPS instrument [19], were used to reduce the response burden due to reduced memory and cognitive capacity among aging populations [20].

Clinical records were used to determine patients' co-morbidity status. A patient was considered having a co-morbidity if they had on their records at least one of these conditions: hypertension, dyslipidemia, diabetes, chronic kidney disease, chronic liver disease, and chronic lung disease. Other clinical data collected were history of myocardial infarction, history of brain stroke, family history of cardiovascular diseases, type of ACS (UA/NSTEMI or STEMI), duration of treatment in months, the number of damaged vessels, and Left Ventricular Ejection Fraction (LVEF) (<40%, 40-50%, >50%) [21].

HRQOL was assessed using EQ-5D-5L and EQ-VAS that were developed by the EuroQoL Group [22, 23, 24, 25]. The EQ-5D-5L covers five HRQOL dimensions including mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each dimension has five response options representing for a health status and ranging from having no, slight, moderate, severe, or extreme problems. Vietnamese value sets was then used to convert a health status into health utility index score [26]. EQ-VAS evaluates imaginable health status that ranges from 0 (worst condition) to 100 (best condition). EQ-5D-5L and EQ-VAS are not time-consuming and easy to use. Their validity and reliability have been tested in previous studies [27, 28, 29].

2.4. Data analysis

Data were entered using Epidata v3.1 and analysed using STATA v13. Frequency and percentage were calculated for categorical variables. Mean and standard deviation (SD) were generated for continuous variables. Descriptive statistics were presented for the whole sample and by treatment type (i.e. OMT vs. PCI/OMT). Differences in sample characteristics between two treatment types were tested using either Chi-squared/Fisher's exact tests (for categorical variables) or two-sample t-tests (for continuous variables). These tests were also used to test associations between each HRQOL dimension and type of ACS treatment.

The outcomes were EQ-5D-5L and EQ-VAS scores which were analyzed separately using linear regressions. Two models were run for each outcome. Model 1 were to test bivariate associations between the outcomes and independent variables including types of ACS treatment, age group, gender, weight status, marital status, education level, employment status, smoking, drinking, co-morbidities, the number of damaged vessels and LVEF. Model 2 were multivariable models that tested associations of independent variables adjusting for the other covariates. Crude and adjusted regression coefficients with their 95% confidence interval were reported. A two-sided p-value of less than 0.05 was considered as statistical significance.

2.5. Ethical considerations

The study was approved by the Ethics Committee of the University of Medicine and Pharmacy at Ho Chi Minh City (No. 126/ĐHYD-HĐĐĐ on 20 March 2019) and Nhan Dan Gia Dinh Hospital (No. 07/KHTH-QLTTSL on 22 April 2019).

3. RESULTS

A total of 125 ACS patients were screened and 113 patients (90%) were agreed to participate in the study. Of these, 73 patients (65%) received PCI/OMT, and 40 patients (35%) received OMT alone. The mean age was 61 years (SD=11 years), ranging from 34 to 84 years. Table 1 shows sample characteristics. Majority of patients were <65 years old (57%), men (68%), overweight/obese (57%), and married (80%). About half completed senior high school (53%) and were not working (58%). Most lived inside HCMC (84%) and was non-poor (85%).

The percentage of smoking and drinking in the sample were 15% and 11%, respectively. More than half of patients engaged in at least 30 minutes of moderate-vigorous physical activity in at least 5 days/week and within 30 days (55%). Most patients (87%) had at least one co-morbidity. The percentage of patients had a history of myocardial infarction and a history of brain stroke was 8% and 6%, respectively. About one in 10 patients had a family history of cardiovascular disease and half was UA/NSTEMI. Nearly half of patients had three damaged vessels (47%), following by two (29%) and one (24%). Three quarter of patients had LVEF >50%, 13% had LVEF 40-50%, and 14% had LVEF <40%. The average duration of treatment was 9.4 ± 2.3 months, ranging from 6 to 12 months. There were differences between PCI/OMT and OMT groups in working status (p=0.02), health insurance (p=0.02), the number of damaged vessels (p=0.02), and place of residence (p=0.05).

Table 1: Demographic, clinical and angiographic characteristics of the sample (n=113)

Characteristics	Sample (n=113) N (%)	PCI (n=73) N (%)	OMT (n=40) N (%)	p-value
Age-group				
<65	64 (57)	46 (63)	18 (45)	0.07
≥65	49 (43)	27 (37)	22 (55)	
Gender				
Male	77 (68)	51 (70)	26 (65)	0.60
Female	36 (32)	22 (30)	14 (35)	
Weight status				
Normal	49 (43)	30 (41)	19 (48)	0.51
Overweight/Obesity	64 (57)	43 (59)	21 (53)	
Marital status				
Single/separated/divorced/widowed	23 (20)	16 (22)	7 (18)	0.58
Married	90 (80)	57 (78)	33 (83)	
Educational level				
Junior high school or lower	53 (47)	31 (43)	22 (55)	0.20
Senior high school or higher	60 (53)	42 (58)	18 (45)	
Place of residence				
Inside HCM city	95 (84)	65 (89)	30 (75)	**0.05**
Outside HCM city	18 (16)	8 (11)	10 (25)	
Working status				
No working	66 (58)	37 (51)	29 (73)	**0.02**
Currently working	47 (42)	36 (49)	11 (28)	
Household economic				
Poor	17 (15)	10 (14)	7 (18)	0.59
Non-poor	96 (85)	63 (86)	33 (83)	
Health insurance				
No	8 (7)	2 (3)	6 (15)	**0.02[a]**
Yes	105 (93)	71 (97)	34 (85)	
Smoking				
No	96 (85)	64 (88)	32 (80)	0.28
Yes	17 (15)	9 (12)	8 (20)	
Drinking alcohol				
No	101 (89)	65 (89)	36 (90)	0.87

Characteristics	Sample (n=113) N (%)	PCI (n=73) N (%)	OMT (n=40) N (%)	p-value
Yes	12 (11)	8 (11)	4 (10)	
Physical activity				
No	51 (45)	32 (44)	19 (48)	0.71
Yes	62 (55)	41 (56)	21 (53)	
Co-morbidity				
No	15 (13)	10 (14)	5 (13)	0.86
Yes	98 (87)	63 (86)	35 (88)	
History of myocardial infarction				
No	104 (92)	68 (93)	36 (90)	0.72[a]
Yes	9 (8)	5 (7)	4 (10)	
History of brain stroke				
No	106 (94)	71 (97)	35 (88)	0.10[a]
Yes	7 (6)	2 (3)	5 (13)	
Family history of cardiovascular disease				
No	101 (89)	63 (86)	38 (95)	0.21[a]
Yes	12 (11)	10 (14)	2 (5)	
Type of ACS				
UA/NSTEMI	56 (50)	25 (34)	31 (78)	**<0.01**
STEMI	57 (50)	48 (66)	9 (23)	
Duration of treatment in months (Mean ± SD)	9.4 ± 2.3	9.3 ± 2.2	9.7 ± 2.4	0.37[b]
The number of damaged vessels				
1	27 (24)	13 (18)	14 (35)	**0.02**
2	33 (29)	27 (37)	6 (15)	
3	53 (47)	33 (45)	20 (20)	
LVEF				
<40%	16 (14)	9 (12)	7 (18)	0.35
40-50%	15 (13)	12 (16)	3 (8)	
>50%	82 (73)	52 (71)	30 (75)	

PCI: percutaneous coronary intervention; OMT: Optimal medical therapy; ACS: acute coronary syndromes; UA/NSTEMI: unstable angina/non-ST elevation myocardial infarction; STEMI: ST elevation myocardial infarction; LVEF: Left Ventricular Ejection Fraction; SD: Standard deviation.

**Co-morbidity was yes if patient had one of the following diseases including hypertension, dyslipidemia, diabetes, chronic kidney disease, chronic liver disease or chronic lung disease*

Chi-square test used except otherwise stated

[a]*Fisher exact test*

[b]*The two-sample t-test with equal variances*

Table 2 shows that more than one-third of the patients reported having problems with usual activity (43%), pain/discomfort (40%), or anxiety/depression (33%). About one-fifth had problem with mobility. Percentage of patients having problem with self-care was small (7%). Mean scores for EQ-5D-5L utility index and EQ-VAS scores were 0.88 (SD=0.15) and 65.6 (SD=13.3), respectively. There was no statistically significant difference in five HRQOL dimensions between PCI/OMT and OMT groups.

Table 2: EQ-ED-5L and EQ-VAS scores, and percentages of reporting problems in five dimensions of EQ-5D-5L (n=113)

	Sample (n=113)	PCI (n=73)	OMT (n=40)	p-value
Mobility (n, %)				
No problem	88 (78)	56 (77)	32 (80)	0.69
Having problems	25 (22)	17 (23)	8 (20)	
Self-care (n, %)				
No problem	105 (93)	69 (95)	36 (90)	0.45[a]
Having problems	8 (7)	4 (6)	4 (10)	
Usual activity (n, %)				
No problem	64 (57)	39 (53)	25 (63)	0.35
Having problems	49 (43)	34 (47)	15 (38)	
Pain/discomfort (n, %)				
No problem	68 (60)	43 (59)	25 (63)	0.71

	Sample (n=113)	PCI (n=73)	OMT (n=40)	p-value
Having problems	45 (40)	30 (41)	15 (38)	
Anxiety/depression (n, %)				
No problem	76 (67)	46 (62)	30 (75)	0.19
Having problems	37 (33)	27 (37)	10 (25)	
EQ-5D-5L (Mean ± SD)	0.88 ± 0.15	0.87 ± 0.15	0.89 ± 0.15	0.37[b]
EQ-VAS (Mean ± SD)	65.6 ± 13.3	64.7 ± 13.4	67.1 ± 13.1	0.36[b]

PCI: percutaneous coronary intervention; OMT: Optimal medical therapy; SD: Standard deviation; Higher EQ-5D-5L utility index score represents better quality of life. Higher EQ-VAS score represents better health status.
Chi-squared test used except otherwise stated
[a]*Fisher exact test*
[b]*The two-sample t test with equal variances*

Table 3 shows associations between EQ-5D-5L utility index and EQ-VAS scores with treatment groups and other variables. In the bivariate analysis with EQ-5D-5L utility index as an outcome, patients with overweight/obesity had 0.06 points (95%CI: 0.00, 0.11) higher than those normal weight; patients with senior high school had 0.09 points (95%CI: 0.04; 0.14) higher than those with junior high school; those smoking had 0.14 points (95%CI: -0.21; -0.07) lower than those without smoking; those who were active had 0.07 points (95CI%: 0.02; 0.13) higher than inactive ones; and those with three damaged vessels had 0.09 points (95%CI: -0.16; -0.03) lower than those with one damaged vessel.

Bivariate analysis with EQ-VAS score as an outcome showed that patients ≥65 years had 5.54 points (95%CI: -10.5; -0.62) lower than those <65 years. Those completing senior high school had 8.17 points (95CI%: 3.42; 12.92) higher than those with only junior high school. Patients with a job had 5.01 points (95%CI: 0.04; 9.98) higher than those unemployed. Those being active had 5.78 points (95%CI: 0.89; 10.67) higher than inactive ones. Patients with three damaged vessels had 8.76 points (95%CI: -14.82; -2.7) lower than those with one damaged vessel.

In multivariable analyses, weight status, physical activity and smoking were independently associated with EQ-5D-5L utility index. Overweight/obese patients had 0.06 points (95%CI: 0.00; 0.11) lower than non-overweight/obese patients; active patients had 0.07 points (95%CI: 0.02; 0.12) higher than inactive patients; and smokers had 0.15 points (95%CI: -0.23; -0.06) lower than non-smokers. However, only physical activity remained significantly associated with EQ-VAS score. Active patients had 5.59 points (95%CI: 0.43; 10.75) higher than inactive ones. Although EQ-5D-5L utility index was not different between PCI/OMT and OMT groups in the bivariate analysis, the PCI/OMT group had 0.07 points (95%CI: -0.1; -0.01) lower than the OMT group after controlling for other variables. Similar results were found for EQ-VAS score that was 6.86 points (95%CI: -13.16 to -0.56) lower for the PCI/OMT compared to the OMT group after controlling for other variables.

Table 3: Linear regression to assess associations between independent variables with EQ-5D-5L and EQ-VAS scores (n=113)

	EQ-5D-5L		EQ-VAS	
	Model l Coef. (95%CI)	**Model 2 Coef. (95%CI)**	**Model l Coef. (95%CI)**	**Model 2 Coef. (95%CI)**
PCI vs. OMT	-0.03 (-0.08; 0.03)	**-0.07* (-0.14; -0.01)**	-2.39 (-7.58; 2.81)	**-6.86* (-13.16; -0.56)**
Age group (≥65 vs. <65)	-0.01 (-0.07; 0.05)		**-5.54* (-10.5; -0.62)**	
Gender (Female vs. Male)	-0.02 (-0.08; 0.04)		-5.26 (-10.52; 0.00)	
BMI group (overweight/obese vs. normal weight)	**0.06* (0.00; 0.11)**	**0.06* (0.00; 0.11)**	1.07 (-3.96; 6.09)	
Marital status (Other vs. Married)	0.04 (-0.03; 0.11)		5.54 (-0.56; 11.64)	
Educational level (Senior vs. Junior high school)	**0.09** (0.04; 0.14)**		**8.17** (3.42; 12.92)**	
Place of residence (Inside vs. Outside HCM city)	-0.01 (-0.09; 0.06)		-0.69 (-7.50; 6.11)	
Working status (Currently working vs. No)	0.04 (-0.02; 0.09)		**5.01* (0.04; 9.98)**	
Health insurance (Yes vs. No)	-0.03 (-0.14; 0.07)		-1.79 (-11.50; 7.92)	
Household economic (Non-poor vs. poor)	0.07 (0.00; 0.15)		5.81 (-1.07; 12.69)	

	EQ-5D-5L		EQ-VAS	
	Model l Coef. (95%CI)	**Model 2 Coef. (95%CI)**	**Model l Coef. (95%CI)**	**Model 2 Coef. (95%CI)**
Smoking status (Yes vs. No)	**-0.14** (-0.21; -0.07)**	**-0.15** (-0.23; -0.06)**	-1.93 (-8.98; 5.03)	
Drinking status (Yes vs. No)	0.03 (-0.06; 0.12)		1.77 (-6.31; 9.85)	
Physical activity (Yes vs. No)	**0.07** (0.02; 0.13)**	**0.07* (0.02; 0.12)**	**5.78* (0.89; 10.67)**	**5.59* (0.43; 10.75)**
Comorbidity (Yes vs. No)	-0.05 (-0.14; 0.03)		-4.78 (-12.07; 2.50)	
History of myocardial infarction (Yes vs. No)	-0.02 (-0.12; 0.08)		-4.01 (-13.19; 5.16)	
History of brain stroke (Yes vs. No)	-0.10 (-0.22; 0.01)		-5.95 (-16.23; 4.32)	
Family history of cardiovascular disease (Yes vs. No)	0.04 (-0.05; 0.13)		7.46 (-0.51; 15.42)	
ACS diagnosis (UA/NSTEMI vs. STEMI)	0.00 (-0.06; 0.05)		4.52 (-0.39; 9.43)	
Duration of treatment in months	0.00 (-0.01; 0.01)		0.49 (-0.60; 1.59)	
The number of damaged vessels				
Two vs. One damaged vessel	-0.02 (-0.09; 0.05)		-4.23 (-10.88; 2.42)	
Three vs. One damaged vessel	**-0.09* (-0.16; -0.03)**		**-8.76** (-14.82; -2.70)**	
LVEF				
40-50% vs. <40%	-0.02 (-0.13; 0.08)		-1.04 (-10.60; 8.51)	
>50% vs. <40%	0.03 (-0.05; 0.11)		0.48 (-6.79; 7.74)	

PCI: percutaneous coronary intervention; OMT: Optimal medical therapy; ACS: acute coronary syndromes; UA/NSTEMI: unstable angina/non-ST elevation myocardial infarction; STEMI: ST elevation myocardial infarction; LVEF: Left Ventricular Ejection Fraction; Coef.: regression coefficient; 95%CI: 95% confidence interval
Model 1: crude bivariate model between each independent variable with EQ-5D-5L utility index and EQ-VAS scores.
Model 2: multivariable model included treatment group, age group, gender, weight status, marital status, educational level, place of residence, working status, household economic, health insurance, smoking status, drinking status, physical activity, co-morbidity, history of myocardial infarction, history of brain stroke, family history of cardiovascular diseases, type of ACS, duration of treatment in months, the number of damaged vessels, and LVEF.
**p<0.05, **p<0.01*

4. DISCUSSION

The EQ-5D-5L utility index (0.88, SD=0.15) among ACS patients in this study was similar to that of the Vietnamese general population aged 35+ (0.89, SD=0.16), but EQ-VAS score (65.6, SD=13.3) was lower (86.4, SD=13.4) [30]. Additionally, the percentages of ACS patients reporting a problem in five HRQOL domains were also higher than those of the Vietnamese general population aged 35+ including usual activities (43% vs. 28%), pain/discomfort (40% vs. 13%), anxiety/depression (33% vs. 18%), and mobility (22% vs. 7%), and self-care (7% vs. 4%) [30]. This is expected because participants in this study were ACS patients and a half of whom were 65 years or older who may rate their EQ-VAS score worse [31]. It is noted that EQ-VAS score is a one-item general patients' perspective scale whereas EQ-5D-5L utility index reflects societal perspectives and addresses five dimensions of life.

For all HRQOL domains, no difference in percentages of self-reported problems between PCI/OMT and OMT groups was found. However, it seemed that PCI/OMT groups had lower HRQOL scores than OMT groups. It is important to point out that while the differences in HRQOL scores were statistically significant, they may not be clinically significant due to small effect. Given the cross-sectional nature of this study, it is also likely that patients with PCI/OMT had worse health status than those with OMT and therefore lower HRQOL before treatment [32]. Studies with stronger designs found that PCI/OMT groups had better HRQOL than OMT groups 6-12 months after medical interventions, however, the difference was not found after 12 months [13, 33, 34]. Although the two medical interventions had been proved to be generally safe [7, 8, 9], there are reports on complications that might decrease HRQOL [35, 36]. For example, using antiplatelet agents in OMT can cause major bleeding by erosive gastritis [36] and that could affect HRQOL [37]. Severe hemodynamic compromise or even death can occur during PCI procedure [38]. Despite the potential

complications, both PCI/OMT and OMT alone were found to provide similar benefits in reducing mortality rate and releasing angina [35].

In this study, overweight/obese patients had EQ-5D-5L utility index slightly higher, but no difference was observed in EQ-VAS score. The association between BMI and HRQOL was inconsistent, complex and could not be generalizable [39, 40]. A study showed that those with BMI>30 was 30% had lower HRQOL compared to those with BMI<25 adjusting for age, gender, education level, and social class [40]. However, another study showed a non-linear association between BMI and HRQOL with interaction by age and gender in each domain of HRQOL [39]. In sum, after adjusting for age, gender, co-morbidity, diet and physical activity, 70-year old normal weight men had 0.03 points higher than 70-year old obese men but women with higher weight had lower physical HRQOL [39].

The bivariate analysis showed positive association between education level and EQ-5D-5L utility index and EQ-VAS scores; however, the association was disappeared in the multivariable analysis that was consistent with a previous study conducted in Vietnamese general population [30], although studies conducted in other countries suggested people with higher education level had better HRQOL [41, 42]. The Vietnamese study explained that those who had higher education were more likely to suffer mental disorder that could reduce HRQOL [30]. However, the association between education level with anxiety/depression domain of EQ-5D-5L was tested but no association was found in this study. It is also noted that higher education level is associated with higher income, better working status and better living condition thus result in better HRQOL [43]. Working status is an important factor affecting quality of life because it shows one's socio-economic status and types of activities and levels of functions [30, 42, 44, 45].

In this study, the percentage of smoking (15.0%) was lower compared to that reported in Global Adult Tobacco Survey in Vietnam (22.5%) [46] and the percentage of drinking (11.0%) was lower compared to that from a survey of rural district in the north of Vietnam (35%) [47]. This may be due to the fact that our study population is ACS patients, many of whom were likely to minimize or even stop smoking and drinking after learning about their health condition [48]. Although smoking and drinking increase the risk of morbidity and mortality [49], only smoking was associated with HRQOL in this study. Smoking has negative effects on health that has been clearly demonstrated in many populations [50]. Smoking was also the only factor with a clinically meaningful effect on EQ-5D-5L utility index in this study [32]. This is consistent with a previous longitudinal study reporting that smokers had HRQOL scores after PCI improved less than non-smokers [51].

Physical activity were another lifestyle factor with positive effect on HRQOL and this is consistent with previous findings [52]. At least 30 minutes of moderate-vigorous physical activity in at least 5 days/week was beneficial to ACS patients although this is just a recommendation and should be conditional on individual health status [53]. It is also worth noting that prevalence of insufficient physical activity was about 30% in general populations worldwide [54]. As the Vietnamese population is quickly aging that increased age-related health problems [14], providing physical activity programs which are mostly unavailable at the moment, could be an effective way to improve HRQOL among older populations [55, 56].

This study has some limitations. Firstly, it is a cross-sectional study and therefore, causal relationship between HRQOL and other factors could not be assessed. Secondly, although some clinical characteristics were extracted from hospital records, other data were self-reported and therefore subject to recall bias. Another limitation was that angina's characteristics such as severity, frequency or reliefs were not collected as the effectiveness of PCI significantly depends on angina's characteristics [16]. Lastly, data were collected in only one hospital and the sample was not large and therefore, generalizability of the findings may be limited.

Conclusion

In conclusion, differences in EQ-5D-5L utility index and EQ-VAS scores between PCI/OMT and OMT groups were not clinically meaningful. Smoking and physical activity are important factors influencing HRQOL among older Vietnamese populations. Interventions to improve lifestyle behaviours, particularly smoking and physical activity, are needed to improve HRQOL among ACS patients.

LIST OF ABBREVIATIONS

ACS: Acute Coronary Syndrome; CHD: Coronary Heart Disease; CVD: Cardiovascular disease; OMT: Optimal Medical Therapy; PCI: Percutaneous coronary intervention; NSTEMI: non-ST elevation myocardial infarction; STEMI: ST elevation myocardial infarction; UA: unstable angina.

CONFLICT OF INTEREST

The authors declared no conflict of interests.

ACKNOWLEDGEMENTS

TTN and KGT designed the study. TTN collected data. ADN and TTN supported in data collection. TTN and KGT drafted the manuscript. KGT, TTN, HNVA and QGT did the analysis and edited the manuscript. All authors contributed to interpretation of the data, critically reviewed and approved the manuscript.

We thank the Executive Board of Nhan Dan Gia Dinh Hospital for approving this study; doctors, nurses and staff-members of the Department of Interventional Cardiology, Nhan Dan Gia Dinh Hospital for supporting and assisting with data collection; and all patients for participating in this study.

FUNDING

No funding.

ORCID ID

Quyen G. To https://orcid.org/0000-0002-3355-6326

Kien G. To https://orcid.org/0000-0001-5038-5584

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