

Understanding quality-of-life determinants in coronary arterial disease patients

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ABSTRACT

The study aimed to examine the correlation of determinant factors of quality of life in coronary arterial disease (CAD) patients, including knowledge of disease, smoking cessation, physical activity, and dietary regulation. A quantitative, cross-sectional study using convenience was conducted among 216 CAD patients from the West Sumatra, Indonesia, outpatient cardiovascular center. Data were collected using the cardiovascular disease knowledge assessment questionnaire, smoking cessation, physical activity, diet questionnaire, and self-assessment questionnaire to measure knowledge of the disease, smoking cessation, physical activity, diet, and quality of life, respectively data analysis using Chi-square, Pearson correlation, and multivariate linear regression test. The result showed that dietary regulation was the most influential variable on the quality of life of CAD patients ($B=1.670$, $SE=0.341$), followed by smoking cessation, physical activity, and knowledge about the disease. Our data suggest that dietary regulation, smoking cessation, and regular physical activity as modifiable CAD risk factors and disease knowledge improve the quality of life of CAD patients. Future research and clinician intervention for CAD awareness of lifestyle modification should be expanded to focus on barriers and their challenges during cardiac rehabilitation.

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1. INTRODUCTION

Cardiovascular disease is one of the non-communicable diseases (NCDs) that cause significant deaths worldwide [1]. American Heart Association data shows that about 19.1 million deaths globally are caused by cardiovascular disease [2]. In Indonesia, coronary arterial disease (CAD) is the number one cause of death and disability compared to other NCDs. Based on the data from Ministry of Health of the Republic of Indonesia the prevalence of patients with CAD experience an increase yearly and the death rate from CAD is projected to continue to increase to 23.3 million people in 2030 [3]. The prevalence of heart disease based on a doctor's diagnosis is about 1.5%. The prevalence of heart disease in West Sumatra is 1.6% and ranks 10th highest prevalence in Indonesia [3], [4].

CAD adversely affects the quality of life of patients due to complaints of symptoms of the disease that are felt, such as chest pain, shortness of breath, inability to move, recurrence of the disease, and re-attacks [4]. Based on the studies from Syaibatul *et al.* [5], they have explained that coronary arterial disease

patients have a lower quality of life compared to healthy individuals. Another study found 70.9% of CAD patients still have a low quality of life, and 47.9% of CAD patients have a poor quality of life [6]. The results also suggested that the quality of life of patients with stable angina was much lower than patients who had done percutaneous coronary intervention (PCI) [7]. Previously in Tibet more specific quality of life in CAD patients, with an average score of 57.20 (SD=21.70) for the physical dimension and 63.63 (SD=20.66) for the mental dimension [8]. These results show that the quality of life of CAD patients in Tibet is still at an average threshold. The lower of quality of life has an impact on increasing disease recurrence, remission, recurrence, psychological stress, hopelessness, and loss of patient motivation in undergoing treatment programs [5], [9], [10].

Good quality of life is essential to ensure patients could maintain their best function and health status, reduce the risk of disease recurrence and rehospitalization, and reduce morbidity and mortality [11]. In improving patients' quality of life, the patient's knowledge of the disease is essential. The knowledge could promote behavioral knowledge that can be applied independently to maintain health status at home. This can reduce recurrence rates, remissions, hospitalization costs, and further complications of the disease and improve patients' health status and quality of life [12], [13].

A previous study found that the correct prediction of knowledge related to CAD in adults is only around 75.9% [14]. Another study suggested that the average knowledge of CAD patients in China about the drugs they should take is good was only around 25.5% [15]. In that study's results, researchers still found that more than 6% of heart disease patients do not know the signs and symptoms of the disease, including danger signs that patients should watch out for. Another study found that more than a quarter of CAD patients' still need to learn the importance of controlling risk factors and changing behavior in controlling risk factors [16]. Changes in behavior, quitting smoking, active physical activity, and dietary arrangements can reduce readmission, rehospitalization, and mortality and improve patients' quality of life [17]. American Heart Association/American College of Cardiology Foundation recommendations lifestyle changes for CAD patients including quitting smoking, doing regular physical activity (at least 30 minutes every day), and setting a good diet (low fat, low cholesterol, low sodium, high fiber, and vegetable sources) [18], [19]. The research on CAD patients conducted by Al-Zaru *et al.* [20] show that 41% of CAD patients still do not adhere to healthy lifestyles. Smoking is directly associated with worsening health conditions in CAD patients, increasing the risk of death. The risk is higher in smokers who still smoke than those who have quit smoking. Non-ST elevated smoking patients who experience acute coronary syndrome (ACS) are predicted to have a poor prognosis and a high mortality rate (one year) [21], [22].

Another study also found that patients who currently still smoke have the potential to have a low quality of life, despite undergoing revascularization measures [23]. Research conducted by Al-Zaru also show that 6.2% of CAD patients still do not comply with regular physical activity [20]. While awake physical activity can increase myocardial perfusion, reduce symptoms, and improve quality of life [24]. Patients with an active lifestyle have a 50% lower mortality risk than physical inactivity patients [25]. Correct diet regulation can control the body's metabolic factors, reducing disease recurrence rates and mortality risks [26]. The results found that dietary modifications in coronary heart disease patients can help lower blood pressure, pulse frequency, and dose of anti-ischemic drugs [27]. Lifestyle modifications positively affect risk factors in maintaining health status [28]. However, those studies Pons *et al.* [23] assessed several variables, but no study has been done assessing multiple life style modification domains. This study was conducted to identify the relationship between knowledge of the disease, quiet smoking, physical activity, dietary regulation and quality of life among patients with CAD.

2. METHOD

This study was a correlational, cross-sectional study designed to assess the correlation between knowledge of the disease, smoking, physical activity, diet, and quality of life among patients with coronary arterial disease. The study was conducted in the outpatient cardiovascular center of Dr. M. Djamil Hospital in West Sumatra, Indonesia, from February to June 2023. The population in this study was 490 CAD patients with cardiovascular disease who underwent outpatient treatment at the cardiovascular center of Dr M Djamil Hospital, Padang, Indonesia. A total of 216 respondents were recruited using a convenience sampling technique. The inclusion criteria were patients diagnosed with coronary arterial disease, have a smoking history, are over 18 years old, and have more than six months of suffering from the disease. Patients with moderate to severe pain and cognitive disorders were excluded from the study.

The knowledge of the disease, smoking cessation, physical activity, and diet were a predictor and independent variables. Quality of life was the outcome and dependent variable. The socio-demographic questionnaire was used to collect data characteristics of the respondents (age, gender, education, occupation, marital status, time in suffering disease, comorbidity, and cardiac revascularization). Knowledge of the disease was obtained using the coronary artery disease education questionnaire (CADEQ), consisting of 19 multiple-

choice questions. The correct alternative is full knowledge with a score of 0–3. This instrument is acceptable for the psychometric validation (Cronbach alpha=0.80). Lifestyle modification consists of smoking cessation, physical activity, and diet. The smoking cessation questionnaire is a valid and reliable instrument to measure smoking cessation among patients with CAD. The questionnaire comprised 20 items and required the answer on the Guttman scale (with 1=yes and 0=no) (Cronbach alpha=0.68). The physical activity questionnaire was used to determine the physical activity in patients with CAD, consisting of 5 items with a Likert scale (with none=0, lower than 1 hour=1-3 hours=2, and up to 3 hours=3) (Cronbach alpha=0.52). The short fat questionnaire (SFQ) was used to measure the diet of patients with CAD. The SFQ consists of 14 questions; respondents must answer on a 5-point Likert scale. The SFQ has acceptable psychometric properties (Cronbach alpha=0.85). The Seattle angina questionnaire (SAQ) measures the health-related QoL of patients with CAD with five items: physical limitation, anginal frequency, anginal stability, treatment satisfaction, and disease perception. The SAQ uses the Likert scale, with scores ranging from 0 to 100, with higher scores indicating better QoL (Cronbach alpha=0.89).

During the research, research teams explained the study objectives, data collection procedures, and the rights of respondents if they were involved in the study. The questionnaires were administered to the respondents after consent forms were obtained from them. The questionnaires were principally completed by the respondents and the researcher, such as explaining some particular items when necessary. Each respondent spent approximately 15-20 minutes completing all questionnaires. Descriptive statistics such as frequency and percentage were used to describe the characteristic respondents. Chi-square and the Pearson correlation coefficient were used to identify determinant factors of QoL ($p < 0.05$). Before that, the normality test was conducted using the Kolmogorov-Smirnov test. The data distribution was significantly normal for all variables ($p > 0.05$). The multiple linear regression model further analyzes the significant quality of life factors among CAD patients. All statistical tests were two-sided; a p -value < 0.05 was considered statistically significant. Ethical approval was obtained from the Health Research Ethics Committee Dr. M. Djamil Hospital, Padang, Indonesia (no:LB.02.02/5.7/270.2023). Patients were required to consent in writing before they participated in this study.

3. RESULTS AND DISCUSSION

3.1. Results

3.1.1. Respondents characteristic

A total of 216 respondents participated in the study. Table 1 shows that most of the respondents were aged 60-69 years (36.1%), male (95.8%), university graduated (46.3%), worked as an employee (36.1%), married (91.2%), time suffering from disease 1-5 years (64.8%), there was no comorbidity (68.5%) and no cardiac revascularization (57.9%). The mean score of disease knowledge was 29.96 (SD=8.166). Further analysis found the association of demographic characteristics and disease knowledge with QoL among CAD patients. Marital status, comorbidity, and knowledge of disease have a significant relationship with QoL ($p=0.033$; $p=0.029$; $p=0.005$) as shown in Table 1.

3.1.2. Life style modification

The mean of lifestyle modification, including smoking cessation, physical activity, and dietary regulation, was 12.13, 6.97, and 8, respectively as shown in Table 2. Given that the total scores of smoking cessation, physical activity, and diet were 20, 15, and 14, respondents' smoking cessation and diet were moderate, and physical activity was low.

3.1.3. Quality of life among CAD patients

Regarding the quality of life, the mean score of total QoL was 63.8 (SD=13.2). QoL consists of five domains including physical limitation, anginal stability, anginal frequency, and treatment satisfaction. Scores for each domain of QoL were physical limitation (62.1), anginal stability (57.5), anginal frequency (75.8), and treatment satisfaction (70.9) as shown in Table 3.

3.1.4. The correlation of lifestyle modification with QoL among CAD patients

Table 4 shows that dietary regulation positively correlates with quality of life ($r=0.318$; $p, 0.001$). Physical activity also positively correlated with QoL ($r=0.167$; $p=0.014$). Quitting smoking has a negative correlation with QoL ($r=-0.168$; $p=0.013$).

Table 1. Respondents characteristic (n=216)

Characteristic	N (%)	Mean (SD)	p-value
Age (years)			0.140
<40	19 (8.8)		
40-49 years	25 (11.6)		
50-59 years	75 (34.7)		
60-69 years	78 (36.1)		
70-79 years	19 (8.8)		
Gender			0.806
Male	207 (95.8)		
Female	9 (4.2)		
Education			0.093
Not school	2 (0.9)		
Elementary school	15 (6.9)		
Junior high school	7 (3.2)		
Senior high school	92 (42.6)		
University	100 (46.3)		
Occupation			0.311
No job	24 (11.1)		
Farmer	18 (8.3)		
Civil servant	32 (14.8)		
Housewife	5 (2.3)		
Retired	59 (27.3)		
Employee	78 (36.1)		
Married			0.033*
Unmarried	12 (5.6)		
Married	197 (91.2)		
Divorce	7 (3.2)		
Time in suffering disease			0.163
<1years	32 (14.8)		
1-5 years	140 (64.8)		
>5 years	44 (20.4)		
Comorbidity			0.029*
No	148 (68.5)		
Hypertension	50 (23.1)		
Diabetes meilitus	18 (8.3)		
Cardiac revascularization			0.514
Yes	91 (42.1)		
No	125 (57.9)		
Knowledge of the disease		29.96 (8.166)	0.005*

*statistical significant p<0.05

Table 2. Smoking cessation, physical activity and diet among patients with CAD

Life style modification	Mean	SD	Min	Max
Smoking cessation	12.13	2.2	3	15
Physical activity	6.97	3.028	0	14
Dietary regulation	8.00	2.519	1	13

Table 3. Quality of life among CAD patients

Variables	Mean	SD	Min	Max
Total QoL	63.8	13.2	27	88
Physical limitation	62.1	13.9	9	96
Anginal stability	57.5	24.7	0	100
Anginal frequency	75.8	20.8	0	100
Treatment satisfaction	70.9	15.6	29	100
Disease perception	52.8	15.1	0	92

Table 4. The correlation of lifestyle modification with QoL among CAD patients

Variable	Total r (p-value)	QoL				
		Physical limitation r (p-value)	Anginal stability r (p-value)	Domains Anginal frequency r (p-value)	Treatment satisfaction r (p-value)	Disease perception r (p-value)
Smoking cessation	-0.168 (0.013)*	-0.144 (0.035)*	-0.171 (0.012)*	-0.158 (0.020)*	-0.038 (0.578)	-0.066 (0.332)
Physical activity	0.167 (0.014)*	0.190 (0.005)	0.176 (0.009)*	0.081 (0.234)	0.002 (0.977)	0.153 (0.025) *
Dietary regulation	0.318 (<0.001)*	0.107 (0.118)	0.346 (<0.001)*	0.243 (<0.001)*	0.127 (0.061)	0.257 (<0.001) *

*statistical significant p<0.05

3.1.5. Multivariate analysis

Multiple linear regression tests show that dietary regulation was the most influential factor on the QoL among CAD patients, with a value of $B=1.670$, $p<0.001$. The second factor that contributes to QoL of CAD patients was smoking cessation ($B=-0.998$, $p=0.013$). Physical activity was the third factor that influence on the QoL of CAD patients, ($B=0.729$, $p=0.014$). And knowledge of disease was the last factor that contributes to QoL among CAD patients ($B=0.306$, $p=0.005$) as presented in Table 5.

Table 5. Associated factors of QoL among CAD patients

Variables	QoL				
	B	SE	B	T	p-value
Knowledge of disease	0.306	0.109	0.189	2.811	0.005*
Smoking cessation	-0.998	0.401	-0.168	-2.492	0.013*
Physical activity	0.729	0.295	0.167	2.472	0.014*
Dietary regulation	1.670	0.341	0.318	4.900	<0.001*

*statistical significant $p<0.05$

3.2. Discussion

This study analyzed the relationship between knowledge about disease and lifestyle modification-related risk factors with QoL in CAD patients. This study found that knowledge of disease, smoking cessation, physical activity, and dietary regulation were correlated with QoL in CAD patients. Diet is the most influential factor in the quality of life of CAD patients. The study from Hwalla and Jaafar [29] found that CAD patients with good diet management and quality have ideal weight control and BMI. Dietary arrangements include a composition of fat and cholesterol reduction, increased fiber, selection of plant-based protein sources, and sodium reduction. Diet has been shown to lower the risk of mortality in CAD, reduce the risk of cardiovascular disease recurrence, and improve the QoL of patients' lives [18], [19], [26].

In this study, quitting smoking became the second most influential factor in the QoL of CAD patients. Smoking cessation behavior negatively correlates with QoL, where quitting smoking will increase the QoL of CAD patients. These results are similar to Neglia [30] studies that found that CAD patients who had undergone revascularization and remained actively smoked had lower QoL than the never-smoked population. Quitting smoking is the main target to increase QoL, and good QoL can be used to motivate patients to want to apply lifestyle modifications [23].

In CAD patients who have done coronary artery bypass graft (CABG), it was also found that QoL was higher than in those who did PCI [31]. According to the study from Sia *et al.* [32] also revealed that smoking is associated with the incidence of disease, history of smoking is significantly associated with the incidence of myocardium infarction. Active smokers risk worsening conditions and mortality more than former smokers [33]. Active smokers have worse healthy lifestyle adherence than former smokers, which will affect the decrease in patient QoL [20], [21].

The study also found physical activity to be the third most influential factor in the QoL of CAD patients. This was in line with previous studies' results that suggest that increasingly ideal heart health is closely related to increasing QoL, where one component of heart health is regular physical exercise [19], [24], [28]. Patients who are active in regular exercise have a 50% lower risk of mortality than inactive patients [25]. Physical inactivity is one of the risk factors for CAD, so CAD patients are strongly encouraged to do regular physical activity. Regular exercise can increase oxidation in muscles and vascular vacillation, decrease inflammatory reactions in the vascular endothelium, and help restore cardiopulmonary functional capacity [34]. Active lifestyle modifications can improve physical fitness and mental health and positively affect patient well-being [28].

Knowledge of the disease is the factor that has the weakest influence on QoL in CAD patients. Adequate knowledge of the disease can support patient treatment adherence, decreasing recurrence events readmission, and hospitalization. Adequate knowledge will impact the quality of life of CAD patients [9], [15]. This result is also supported by previous research, which found that perceptions of disease formed by cognitive perceptions affect the quality of life of CAD patients on physical and mental dimensions [35]. A positive cognitive representation of disease can predict a reduced incidence of mortality and premature attacks in female CAD patients [36]. Decreased mortality rates and recurrent events predict increasing CAD patients' QoL [37].

3.2.1. Implication and limitation

The findings in this study show that CAD patients must have adequate knowledge about the disease they suffer to make lifestyle modifications related to disease risk factors. These can improve the quality of

life of CAD patients. Nurses contribute significantly to providing patients with adequate information and health education to increase their awareness of maintaining their health status. We realize the weakness of this study is the primary data of respondents who vary in terms of the length of suffering from the disease, the period of suffering from the disease ranging from less than one year to >5 years. These were potentially biased toward the patient's knowledge of the disease and the lifestyle modifications made. Further research suggested that it could take respondents with a long period of suffering from the same disease.

4. CONCLUSION

The findings of this study prove that diet, smoking, and physical activity are modifiable CAD risk factors, and knowledge about the disease improves the quality of life of CAD patients. Lifestyle modifications related to risk factors coupled with knowledge of the disease significantly improve the QoL of CAD patients. Future research and clinician intervention for CAD awareness of lifestyle modification should identify a focus on the barrier and their challenges during cardiac rehabilitation.




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