

Factors associated with quality of life in patients undergoing coronary angioplasty

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ABSTRACT

Objective: Percutaneous coronary intervention has been effective in increasing longevity of patients with cardiovascular disease. However, the evidence shows that the quality of life after the intervention is still lower than optimal level. The quality of life can be affected by various factors. The aim of this study is to determine the quality of life and its related factors in patients undergoing coronary angioplasty.

Methods: This cross-sectional study was performed on 106 patients undergoing coronary angioplasty during 2015-2016. This study population included all patients who referred to a cardiac clinic in Rasht, Iran, were passed 3 months after their angioplasty. Research samples met the inclusion criteria and were willing to participate to the study, were selected gradually (continually). Research tools were a self-structured questionnaire regarding factors associated with the quality of life and the MacNew quality of life questionnaire. Data were collected through asking patients questions and using patient's medical records. Data analysis was conducted using descriptive and inferential statistics.

Results: The results of multivariate linear regression analysis showed that independent variables of age ($P = 0.0001$), the number of diseased vessels ($P = 0.0001$), and the number of comorbidities ($P < 0.05$) were the most important factors associated with the quality of life.

Conclusion: Health-care professionals can play an effective role in promoting the quality of life of patients undergoing coronary angioplasty by modifying lifestyle based on the related factors and to provide comprehensive care programs, especially for elderly.

Keywords: Cardiovascular disease, percutaneous coronary artery intervention, quality of life

Introduction

Cardiovascular diseases (CVDs) have still remained the most common diseases and the leading cause of death worldwide. It has been predicted to be the cause of 30.5% of the world death toll by the year 2030.¹ In Iran, CVD is one of the main causes of mortality and morbidity and the first cause of death in people over 45 years (26% of the total deaths).²

Nowadays, there are valuable therapeutic strategies such as medication and coronary artery bypass grafting surgery for the treatment of coronary heart disease as the main manifestation of CAD. However, angioplasty is still the most common method of treatment.³ Evidences have shown improved cardiovascular events with early percutaneous coronary intervention (PCI).⁴ However, what eventually is obtained and remained for the patient following a medical or

surgical treatment, is the best and major criterion for judging the effectiveness of that treatment. Health-related quality of life assessment of patients is an indicator for evaluating the effectiveness of medical interventions.⁵

The World Health Organization defines the quality of life as "individual's perception of their position in life in the context of the culture and value systems in which they live and in relation to their goals, ambitions, standards and interests."⁶ Person's position is influenced by physical health, psychological status, personal beliefs, social communications, and relationships with important people in a complex way. The quality of life reflects secondary psycho-emotional benefits for the patient. The decrease in physical limitations, improvement of perception, and health status are the benefits of a successful coronary angioplasty.⁷ Therefore, it is expected that the quality of life will be promoted in the patients with coronary artery after PCI.

Although PCI is an effective method in the treatment of heart disease, health-related quality of life after angioplasty seems not to be desirable.⁸ In fact, treatment in the patients with coronary artery problems is not considered a real and achievable goal; because the disease is debilitating with a progressive course, and multiple internal and external factors have impact on the escalation and improvement of the disease. These characteristics obviously influence the patients' quality of life.⁹ The literature review is showed disparate results regarding some of the factors related to the quality of life in the patients undergoing angioplasty.¹⁰⁻¹² Therefore, this study was performed to determine factors associated with quality of life in these patients. Identifying these factors can help to design education programs and appropriate interventions to promote the quality of life in the patients undergoing angioplasty.

Methods

This cross-sectional study was conducted on 106 patients referred to a cardiac clinic who attended the follow-up visit 3 months after coronary angioplasty during 2015-2016 in Rasht, Iran. 101 participants were calculated based on a previous study¹³ and considering $\sigma = 3.6$, $\alpha = 0.05$, $\beta = 0.2$, $\mu_1 - \mu_0 = 1$ as the following Formula:

$$n = \left[\frac{(z_{\alpha} + z_{\beta})\sigma}{\mu_1 - \mu_0} \right]^2$$

However, we recruited 110 participants to achieve more reliable results. The samples were selected through the consecutive convenience sampling with the inclusion criteria included age older than 18 years, the absence of mental disorders, being first-time angioplasty patient, and being candidate for receiving service from a certain specialist. The reason for selecting the patients of a specialist was to be control the possible effects of patient education after angioplasty and physician follow-up program on the patients' quality of life. After obtaining ethical approval to conduct the study and getting permission from administrators, the researcher daily attended the clinic and extracted the list of patients referred to visit after 3 months of their angioplasty, and after self-introduction and assessing the samples in terms of the eligibility of inclusion criteria, provided the necessary explanations about the study to the participants in a peaceful place and separately. Furthermore, a written informed consent was obtained. Then, asking the participants questions, the questionnaires were completed. Using patients' medical records and statements, information on the factors related to the disease was obtained. Of the 110 people who were on the initial list, 4 patients did not consent to complete the questionnaire. Therefore, the data of 106 people were analyzed. The MaCnew Heart Disease Health-related quality of life instrument was used to determine the participants' quality of life. This instrument developed specifically to measure the quality of life of patients with heart disease, consists

of 27 questions in three subscales: Emotional functioning, physical functioning, and social functioning. 14 questions are in the field of physical functioning, 14 questions are in the field of emotional functioning, and 13 questions are in the field of functioning. 5 questions on the physical functioning subscale evaluate the symptoms of the disease. Allocation of questions in the questionnaire is in a way that each question can be considered in one, two, or all three domains. The total score is calculated by calculating the scores of all questions. Each of the questions of the questionnaire has a 7-point scale ranging from "always" to "never." The highest score on each question is seven, and the lowest score is one which represents the best condition and the worst condition, respectively. The scores of physical functioning domain and emotional functioning domain, each one are between 14 and 98, the score of social functioning domain is between 13 and 91 and the total score of questionnaire is between 27 and 189. The questionnaire has been translated into Persian and localized by Asadi-Lari *et al.* Its validation was conducted through the face validity and content validity, and its reliability was calculated by Cronbach's alpha coefficient that was 0.95.¹⁴ Charlson comorbidity questionnaire was used to determine number of comorbidities on the basis of medical diagnosis.¹⁵ Factors associated with disease were selected through the literature review. After collecting data, the descriptive (mean, standard deviation, and frequency distribution table) and inferential statistics (*t*-test, ANOVA, Pearson's correlation coefficient, and linear regression) were used to determine factors related to the quality of life in patients undergoing angioplasty.

Results

Most of patients were in the age group over 60 years (39.6%), male (67.9%), married (88.7%), resident in urban area (84%), and under diploma (62.3%) (Table 1).

The mean score of the patients' quality of life was 67.16 ± 12.04 (social functioning), 64.33 ± 8.73 (physical functioning), 65.45 ± 9.31 (emotional functioning), and 126.6 ± 15.99 (total quality of life). Furthermore, the mean score of quality of life was higher in the age group 41-50 years (129.59 ± 12.74), men (131.46 ± 15.31), those earning more than two million Tomans (137.66 ± 15.85), level of education of higher than diploma (142.63 ± 9.38), resident in urban area (127.46 ± 15.95), married (130.0 ± 19.2), self-employed people (138.88 ± 15.48), those living with their wives and children (136.66 ± 16.77), and those with supplementary insurance (129.45 ± 17.44). There was a statistically significant relationship between scores of quality of life and age ($P = 0.0001$), gender ($P = 0.039$), and level of education ($P = 0.004$) (Table 2).

Mean score of patients' quality of life was higher in non-smokers (128.72 ± 16.71), non-obese people (130.05 ± 15.17), mono vessel disease (VD) (138.3 ± 8.88), a history of 1-3-year heart disease (126.95 ± 16.11), those with no history of hospitalization after angioplasty (133.75 ± 11.16), those with

Table 1: Patients' characteristics

Variables of demographic	n (%)	Mean±SD	Variables of related to disease	n (%)	Mean±SD
Age		57.7±0.65	Number of diseased vessels		
41-50	16 (15.1)	(Year)	Mono vessel disease	56 (52.8)	
51-60	44 (41.5)		2VD	35 (33)	
>60	46 (43/4)		3VD	15 (14.2)	
Sex			Smoking history		
Female	32 (30.2)		Yes	30 (28.3)	
Male	74 (69.8)		No	76 (71.7)	
Income		866.5±34.8	Number of comorbidities		
<500000	32 (30.2)	(Thousand Tomans)	1	92 (86.8)	1.7±0.06
500000-1000000	30 (28.3)		2	12 (11.3)	
1000000-1500000	28 (26.4)		≥3	2 (1.9)	
1500000-2000000	6 (5.7)				
>2000000	10 (9.4)				
Education level			BMI		
No literate	6 (5.7)		≤25	42 (39.7)	25.79±0.19
Under diploma	66 (62.3)		>25	64 (60.3)	
Diploma	23 (21.7)				
Higher than diploma	11 (10.4)				
Residency			Family history of heart disease		
Urban	89 (84)		Yes	35 (33)	
Rural	17 (16)		No	71 (67)	
Marital status			Family history mental disorders		
Married	94 (88.7)		Yes	14 (13.2)	
Widow	12 (11.3)		No	92 (86.8)	
Living conditions			Coronary artery disease duration		21.48±1.35
Lonely	9 (8.5)		<1 year	30 (28.3)	Month
With spouse	79 (74.5)		1-3 years	44 (41.5)	
With spouse and child	15 (14.2)		>3 years	32 (30.2)	
With child	3 (2.8)				
Job status			Number of hospitalization after angioplasty		
Staff	9 (8.5)		No hospitalization	97 (91.5)	
Worker	4 (3.8)		1 time	7 (6.6)	0.15±0.39
Self-employed	48 (45.3)		>1 time	2 (1.9)	
Homemakers	23 (21.7)				
Unemployed	8 (7.5)				
Farmer	9 (8.5)				
Retired	5 (4.7)				
Supplementary insurance					
No	69 (65.1)				
Yes	37 (34.9)				

SD: Standard deviation

the least number in the comorbidity (131.28 ± 12.93), history of heart disease (129.22 ± 14.67), and those with no mental disorders in the family (133.92 ± 13.5). There was statistically significant relationship between score of quality of life and smoking history ($P = 0.029$), body mass index ($P = 0.018$), number of diseased vessels ($P = 0.0001$), comorbidities

($P = 0.012$), and a family history of heart disease ($P = 0.024$) (Table 3). Results of multivariate linear regression showed that age ($P = 0.0001$), the number of diseased vessels ($P = 0.0001$), and the number of comorbidities ($P < 0.05$) are the most important factors associated with the quality of life in patients undergoing angioplasty (Table 4).

Table 2: Relation demographic factors with QOL score of the patients

Demographic factors	Quality of life	P value	Test
	(mean±SD)		
Age			
41-50	145.12±9.87	P=0.000	Pearson's correlation coefficient R=-0.876
51-60	134.6±7.17		
>60	126.6±15.99		
Sex			T test
Female	124.5±15.91	P=0.039	DF=104
Male	131.46±15.31		
Income			
<500000	123.73±12.7	P=0.055	ANOVA
500000-1000000	124.87±18.77		
1000000-1500000	125.35±14.56		
1500000-2000000	137.6±13.58		
>2000000	137.66±15.85		
Education			
No literate	123.91±16.87	P=0.004	ANOVA
Under diploma	124.63±15.5		
Diploma	129.16±12.49		
Higher than diploma	142.63±9.38		
Residency			T-test
Urban	127.46±15.95	P=0.2	DF=104
Rural	122.11±15.95		
Marital status			T-test
Widowed	126.17±15.59	P=0.43	DF=104
Married	130.0±19.2		
Living condition			
Lonely	123.08±15.97	P=0.315	ANOVA
With spouse	125.86±16.3		
With spouse and child	136.66±16.77		
With child	132.5±12.91		
Job status			
Staff	138.8±15.48	P=0.158	ANOVA
Worker	124.72±14.95		
Self-employed	126.62±20.14		
Homemakers	128.82±16.25		
Unemployed	117.25±18.6		
Farmer	120.77±15.56		
Retired	130.2±10.3		
Supplementary insurance			T-test
No	125.07±15.06	P=0.179	DF=104
Yes	129.45±17.44		

SD: Standard deviation

Discussion

The quality of life in the women was lower than men. Similarly, a study has reported the relationship between gender and the quality of life.¹² It is not clearly recognized that why the quality of life between men and women is different. Psychological factors, different women's perceptions of the symptoms, and health indicators have been considered as the causes of this difference.¹⁶

People with higher level of education had the better quality of life. This relationship has been shown in many studies.^{17,18} Education changes people's attitude and knowledge to health and can lead to improve the quality of life.

The quality of life in married people was higher than widows. However, there was no association between marital status and quality of life. A study has reported a relationship between these two variables.¹⁹ Using different tools in the studies may be a reason for the differences.

People living with their spouses and children had the highest level of quality of life, and lonely individuals had the lowest level of quality of life. Evidences have shown that lonely people have lower level of quality of life than people with sources of support, such as spouse and children.^{17,19}

People who were unemployed had lower quality of life. However, a significant relationship was not observed between job status and quality of life. While a study was reported the relationship between job status and quality of life.²⁰ Perhaps, the reason is related to low number of unemployed people, and larger sample size is needed to assess this association.

Non-smokers had higher level of quality of life, and there was a relationship between smoking and the quality of life. Smoking increases the risk of myocardial infarction and death in patients with heart disease, especially after angioplasty. Smoking limits vascular reconstruction and the maintenance of coronary blood flow by creating microvascular endothelial dysfunction. Furthermore, smoking reduces the ability of individuals to exercise after angioplasty.²¹ Thus, smoking can reduce the quality of life of patients after angioplasty.

People with mono-VD had higher quality of life than others. This finding is consistent with a study.²² Number of vessels affected, as a reflection of disease severity, is the most important determinant of the quality of life.²³

Patients with more comorbidities had worse quality of life. This finding is compatible with many studies.^{17,22} Comorbidities are the most powerful predictors of mental and physical health and therefore quality of life in the patients with heart disease.¹¹

There was an association between family history of heart disease and quality of life. In a study, individuals who had

Table 3: Relation-related disease factors with QOL score of the patients

Demographic factors	Quality of life (mean±SD)	P value	Test
Number of diseased vessels			
Mono vessel disease	138.3±8.88	P=0.0001	ANOVA
2VD	118.88±8.16		DF=2
3VD	100.93±6.59		F=140.128
Smoking history			T-test
Yes	121.23±15.29	P=0.029	DF=104
No	128.72±16.71		T=2.212
Number of comorbidities			
1	131.28±12.93	P=0.005	Pearson's correlation coefficient R=-0.273
2	124.24±18.33		
≥3	119.33±13.08		
BMI			
≤25	128.07±16.17	P=0.456	Pearson's correlation coefficient
>25	125.64±15.92		R=-0.73
Family history of heart disease			T test
Yes	127.46±15.95	P=0.024	DF=58.485
No	122.11±15.95		T=2.322
Family history of mental disorders			T test
Yes	125.48±16.1	P=0.066	DF=104
No	133.92±13.5		T=1.861
Coronary artery disease duration			
<1 year	126.03±15.86	P=0.971	ANOVA
1-3 years	126.95±16.11		DF=2
>3 years	126.65±16.43		F=0.29
Number of hospitalization after angioplasty			
No hospitalization	133.75±11.16	P=0.179	ANOVA
1 time	125.9±16.34		DF=2
>1 time	116.0±16.97		F=1.751

SD: Standard deviation

Table 4: Estimated regression coefficients from the multiple linear regression models to predict quality of life from related factors

Variable	Unstandardized coefficients		Standardized coefficients	t	95.0%, CI		P
	B	Standard error	β		Lower	Upper	
Age	-1.07	0.16	-0.448	-6.7	-7.53	-1.387	0.0001
Number of comorbidities	-1.211	0.99	-0.053	-1.223	-3.177	0.754	0.049
Number of diseased vessels	-10.927	1.461	-0.495	-7.478	-13.827	-8.027	0.0001

Y or dependent variable: Score of quality of life. R²=0.829

a positive family history of the disease had better physical functioning.²⁴ Knowledge of patients with positive family history of the disease concerning self-care and the importance of self-care can affect their quality of life.

People with hospitalization after angioplasty had a lower level of quality of life than others. However, there was a relationship between the history of hospitalization after angioplasty and quality of life. In contrast, a study has reported an association between the quality of life and the number of hospitalization after therapeutic interventions (surgery).²⁰ Differences in results

may be explained by the difference in type of intervention and the fact that the majority of our participants in this study were not readmitted after angioplasty. However, according to Johansson's results, the patients with undesirable quality of life are more likely to be readmitted frequently because over time, they experience multiple and severe symptoms leading to urgent readmission.²⁵

People, who had a family history of mental disorder, had lower score of quality of life than those who had no family history of mental disorder. However, there was no significant relationship

between these two variables. Family support influences individuals' quality of life.²⁶ Therefore, it is expected that if family members have mental disorders, person will not receive the necessary support resulting in reduced quality of life.

People with a higher body mass index had lower level of quality of life. However, a significant association was not observed between the quality of life and body mass index. This finding is consistent with results of Martin's study.²⁷ However, in a study, the score of quality of life obtained through EuroQOL-5D instruments, significantly decreased only in those who had a high BMI.²⁸ The instruments that were used in these studies to measure the quality of life were different from each other and from our study. Contradictory results observed in terms of the relationship between two variables may be related to difference in the quality of life assessment instruments. Therefore, it is required to design and develop a more comprehensive tool for measuring the quality of life in patients with heart disease. Participants' fatigue resulting from the waiting time for follow-up visit, could affect their responses to the questions. Hence, we tried to be completed questionnaires in the early hours of entering the clinic and in a quiet environment.

Conclusion

In general, at this study, age, the number of comorbidities, and the number of diseased vessels were determined as the most important factors associated with patients' quality of life after angioplasty. Accordingly, it seems to be necessary to pay special attention to the elderly people when planning the self-care educational programs after angioplasty. Health-care professionals can play an effective role in promoting the quality of life of patients undergoing coronary angioplasty through raising awareness creating health beliefs in the field of a healthy lifestyle as well as, taking into account the specific circumstance of each individual in terms of the number of comorbidities and the number of diseased vessels to develop the self-care and educational programs. Desirable quality of life is an inalienable individuals' right in any society, and health-care professionals have a vital role in achieving this through awareness of factors associated with the quality of life.

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