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Changes in Functional Status and Functional Capacity Following Coronary Artery Bypass Surgery

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Abstract: The aim of the present study was to compare changes in health related-quality of life (H-RQOL) on physical functioning and mental health domains, changes in functional capacity before and 18 months after CABG surgery. Comprehensive data on 187 patients who underwent CABG surgery were prospectively collected, including preoperative factors and postoperative morbidity. Assessing functional status, the change in physical functioning score and change in mental health score were obtained using the physical functioning and mental health subscales out of the eight total subscales of the (SF-36) questionnaire. Also, functional capacity was estimated according to New York Heart Association (NYHA) class. The results showed 18 months after CABG surgery survival rates were (95.7%). Significant improvements in functional status were seen in physical functioning ($p<0.001$), mental health ($p<0.000$). However, there were no significant changes in the mean of functional status scores among patients in three age groups. Other significant improvement was found in functional capacity and NYHA class before and the 18 months after CABG. Functional status markedly and significantly improved after CABG surgery, particularly in physical functioning. However, the functional status among survivors of CABG surgery is worse than that of the general population. It seems further research is needed to identify factors explaining the change in H-RQOL to develop interventions to support patients.

Key words: Physical functioning, mental health, coronary artery, grafting surgery

INTRODUCTION

The World Health Organization (WHO) defines Health Related Quality of Life (HRQOL) as The individual's perception as his/her position in life, within the cultural context and the values in which he/she lives as well as in relation to his/her objectives, expectations, standards and concerns (Favarato *et al*., 2007). Most conceptualizations of HRQOL are multidimensional and include domains of physical functioning, social functioning, role functioning, mental health and general health perceptions (Stafforda *et al*., 2006). In a study, it has shown physical functioning and mental health are important domains of HRQOL (Penkofer *et al*., 2005).

In another study, functional status (physical functioning and mental health) was reported as a measurement of individual's ability to perform self-care activities indicates the individual's physical and psychological independence within his or her own environment (Sorensen and Wang, 2009). Indeed, it has been systemically shown to predict optimal of the procedures (Hunt *et al*., 2000).

It is a common belief that coronary artery bypass grafting (CABG) is indicated to relieve symptoms, prolong life and improve quality of life (The WHO Group, 1998; Panagopoulou *et al*., 2006; Barrya *et al*., 2006; Faye *et al*., 2009; Esmaeeli *et al*., 2007), particularly in terms of mental and physical functioning (Jenkins *et al*.,

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1990). Several studies have shown that the most significant predictors of QOL after cardiac surgery is QOL before CABG surgery (Beck *et al*., 2001; Noyez *et al*., 2006). But there is conflicting results about improvement of HRQOL in physical and mental functioning after CABG surgery (Hunt *et al*., 2000; Lee, 2008). At all prior evidence suggests however recovery after operation often presents patients with a much greater challenge than expected and the time taken to achieve optimum health is often longer than anticipated (Tolmiea *et al*., 2006). Also, a reduction in cardiac symptoms does not directly translate into improvements in QOL in all domains (Hunt *et al*., 2000; Järvinena *et al*., 2003). One study addressing outcome after cardiac surgery suggests a 15 to 37% rate either no change or deterioration in post operation condition (Hunt *et al*., 2000).

It also has shown that patients with a relatively poor preoperative QOL have a more beneficial QOL and patients with a good preoperative QOL can lose a lot of QOL (Sorensen and Wang, 2009).

Based on present investigations, there were no studies in our country about H-RQOL in med term or long term after CABG surgery particularly in physical functioning and mental health domains. Also, cultural and social characteristics of each society can influence on patients reports about their functioning in different domains of QOL, we aimed to compare the changes in H-RQOL on physical functioning and mental health domains, changes in functional capacity, also compared in this study.

MATERIALS AND METHODS

Comprehensive data on 187 patients who underwent CABG surgery were prospectively collected at Fatemeh Zahra University Hospital in Sari, Iran, between August 2005 and August 2008. This center provides adult open heart surgery services for population of 3,203,087 inhabitants and for neighbor region with 3,974,118 inhabitants that more than 400 CABG procedures performed annually. Lowering the number of procedures may be due to inhabitants' preference to refer to the other open heart surgery centers at the capital of our country.

The study was approved by the ethic committee in research the Mazandaran University of Medical Sciences in 2005. Potential patients for the study were identified through a daily screening of the admission records the research nurse carried out the primary interview according to structured research scheme each patient gave written informed consent to participate. The patients were screened for study inclusion and exclusion criteria. Inclusion criteria were included ability to understand Persian, ambulatory before surgery, ability to respond to an interview situation and exclusion criteria included diagnosis of neuralgic or psychiatric disease or the patients who taking psychoactive medication.

Patients who were eligible and having coronary artery bypass grafting were administered a face to face interview and by telephone 18 months after CABG surgery. With regard to inclusion and exclusion criteria and unavailable data after 18 months for some patients, final sample was compared by 187 patients.

For assessing functional status the change in physical functioning score and change in mental health score were obtained using the Physical Functioning (PF) and Mental Health (MH) subscales of the eight total subscales of the 36-item medical outcomes study short-form health surgery (SF-36). The SF-36 questioner has been extensively used to assess QOL in a variety of cardiac populations. Also, validity and reliability of the questioner assessed in previous studies (Penkofer *et al*., 2005; Jenkins *et al*., 1990; Szygula-Jurkiewicza *et al*., 2005; Bradshaw *et al*., 2006; Mohammadpour and Yousefi, 2008). The baseline status of H-RQOL (in all domains) of the present study was compared with a sample of 4163 healthy individuals aged 15 years and over from the Iranian version of the short-form health surgery (SF-36) functioning (PF) is 0.9 and for mental health (MH) is 0.7 (Montazeri *et al*., 2005).

These subscales were measured QOL on day before surgery and 18 months after CABG surgery. After that, patients were asked to respond based on their functioning in the past month. Row scores for the subscales were transformed. So, that, it is scaled from 0 to 100, with 0 to 100, indicating worst and best possible health respectively (higher scores indicate better perceived health).

We also assessed pre-and 18 months postoperative functional capacity using The New York Heart Association (NYHA) classification.

Variables are presented as percentage for dichotome variables and as Mean±SD and range for numerical variables were tested with the t-test and paired t-test was used to compare the functional status of patients before and 18 months after CABG surgery. p-value <0.05 was considered statistically significant. Data were analyzed using SPSS 16 Software.

RESULTS

Average patient's age was (58.27±9.97). Female patients were older (mean age 59.49 vs 57.29 years). Table 1 showed the baseline characteristics of the CABG patients. Most of the patients were male (N=104, 55.6%), married (N = 186, 99.5%), the majority of the patients had less than 5 years of schooling (N = 131, 70.1%), indicating

Table 1: Baseline characteristic of CABG patients

Variables	No.	Percentage
Gender		
Male	104	55.60
Female	83	44.40
Marital status		
Married	186	99.50
Single	1	0.50
Functional status		
Illiterate	85	45.50
Primary	46	24.60
Secondary (trade)	30	16.00
Secondary	17	9.10
Tertiary	4	2.10
Occupation		
House worker	78	41.70
Employer	18	9.60
Worker	17	9.10
Business	24	12.80
Farmer	29	15.50
Part time	1	0.50
Non working	4	2.10
Duration of heart disease (years)		
1-5	128	68.40
5-10	41	21.90
10-15	17	18.10
Other diseases		
Hypertension	88	47.05
Diabetes	70	37.43
Hyperlipidemia	86	45.98

Table 2: Comparison mean and standard deviation of patients functional status scores before and 18 months after CABG

Domain of functional status	Before CABG ----------(Mean±SD)----------	After CABG	p-value
Physical functioning (PF)	66.05±4.47	87.90±4.67	0.001
Mental health (MH)	70.80±2.36	70.85±0.00	0.00
General functional status	68.25±5.65	79.95±6.02	0.001

a low educational level of the patients in the sample, the most of them 78 (41.7%) were house worker duration of illness (heart disease) in most of the patients, 128 (68.4%) was (1-5) years and more than of 156 (83.4%) had chest pain, until interview time. Most of the patients, 166 (88.8%) also had other diseases. In all, 88 (47.05%) had hypertension, 70 (37.43%) diabet and 86 (45.98%) had hyperlipidaemia.

Survival rates were 95.7%. Eight patients (4.3%) had died during 18 months after surgery, of these more than (75%) had both hypertension and diabet.

Table 2 presents compared the mean and standard deviation scores of functional status for studied population. As a seen, there is statically significant change in overall functional status between before and 18 months after CABG surgery ($p<0.001$).

Finding also showed statistically significant changes in physical functioning ($p<0.001$) and mental health ($p<0.001$) scores 18 months after CABG surgery.

Table 3 showed mean and standard divination of functional status scores with different variables. Totally, the functional status mean scores in male was more than women ($p<0.001$).

Table 3: Mean and standard deviation of functional status score before and after CABG with different variables included in the study

Variables	Functional status before	p-value	Functional status after	p-value
Sex				
Female	61.79±13.72	0.3	74.08±16.93	0.000
Male	72.63±12.86		84.77±8.69	
Age				
<54	68.97±16	0.05	83.26±9.64	0.09
55-64	67.08±13.76		76.84±17.96	
>65	66.18±12.24		79.52±13.81	
Functional status				
Ilitrate	64.61±13.38	0.004	77.61±15.89	0.05
Primary	67.57±14.45		80.02±12.40	
Secondary (trade)	74.46±12.61		84.42±6.68	
Secondary	74.16±13.49		87.27±5.75	
Tertiary	80.27±10.46		100	
Duration of heart disease (years)				
1-5	66.67±13.87	0.02	79.40±14.52	0.04
5-10	64.56±14.64		76.11±15.14	
10-15	64.72±17.47		78.75±**	
Occupation				
House worker	61.68±13.63	0.000	74.55±17.03	0.01
employer	78.85±9.95		90±5.36	
Worker	67.23±13.70		81.97±8.12	
Business	74.42±14.87		82.44±13.59	
Farmer	73.42±8.13		84.50±8.64	
Non working	59.37±19.72		82.22±2.44	
Part time	46.66±--		-	
NYHA class				
I	78.11±13.36	0.000	84.98±8.01	0.02
II	67.07±12.02		79.20±15.23	
III	58.85±9.39		81.66±13.77	
IV	46.54±12.31		67.22±15.54	
Number of vessels disease				
1	65.23±12.15	0.2	87.79±12.04	0.2
2	70.72±14.57		76.87±17.25	
3	66.75±14.56		81.08±12.80	

DISCUSSION

There is a general belief that CABG surgery is associated with good functional relief from angina and improvement H-RQOL (Mohammadpour and Yousefi, 2008; Lee, 2008; Loponena *et al*., 2007). Particularly in terms of physical functioning and mental health. However, there are several studies that shown the wide variety of H-RQOL mean scores reporting.

Our results regarding functioning and mental health showed a significant improvement in the H-RQOL of CABG patients after surgery results has been reported also previously (Panagopoulou *et al*., 2006; Hunt *et al*., 2000; Mohammadpour and Yousefi, 2008; Loponena *et al*., 2007; Rantanen *et al*., 2009).

Also patients had a mean score 66.05±4.47 and 87.9±4.67 on the physical functioning, 70.8 ±2.36 and 70.85 on the mental health before and 18 months after surgery respectively. These informations suggest that patients population had grater scores of functional status on mental health than physical component before surgery, but after surgery they had grater scores of functioning status on physical component than mental health, on the other hand, post operative functional status was

significant improvement on physical functioning than mental health. Present findings are confirmed by previous studies' results (Loponena *et al*., 2007; Lindquist *et al*., 2003). In one study however, it has shown that the cognitive or mental health experience after CABG may be transist or persist about 7 years (Noyez *et al*., 2006). It seems to need more research.

According to the present study, female patients who had CABG were older and had more comobridities than men. The results are in agreement with Tolmie *et al*. (2006). Furthermore, present findings are consistent with findings of previous studies (Jenkins *et al*., 1990; Sorensen and Wang, 2009; Bradshaw *et al*., 2006; Falcoz *et al*., 2006) showed QOL was significantly lower in women than men baseline and during follow up. Nevertheless, Bradshaw *et al*. (2006) in their study illustrated that there was a little difference between men and women. The mechanism behind this finding not entirely clear. There are no data to support the more rapid progress of coronary artery disease in women or higher comorbidity in women.

The impact of education level on QOl is well known (3, 30). In this study, we found difference of course slight significant between educational level and functional status before and 18 months after CABG surgery. It is possible that performance of routine educations for the all studied patients with their difference educational levels could influence on it.

Present finding presented significant difference between duration of coronary artery disease and functional status before and after CABG surgery. On the other hand, base on our findings patients who their duration of coronary artery disease was longer before surgery, their QOl Was inappropriate. Our interpretation of former result is that; the more increase of duration of coronary artery disease, the worse QOl.

Present study showed no influence of age on postoperative QOl in functional status. In several studies also it confirmed (Hunt *et al*., 2000; Rantanen *et al*., 2009; Lindquist *et al*., 2003). In contrast, Hunt *et al*. (2000) demonstrated age is a strongest predictive factor for QOl. Wholly, it seems there is a complex relationship between age and QOl.

Present finding showed no significant difference between the number of diseased vessels and functional status before and 18 months after CABG surgery a finding that has been reported also previously (Panagopoulou *et al*., 2006). It seems more investigation is needed about this variable.

Brorsson *et al*. (2001) compared clinical outcomes following coronary revascularization in patients with chronic stable angina and found physical functioning scores improved within 6 months. Although significantly more bypass patients remained free of angina and did not require sublingual nitroglycerin use after 4 years (Markou *et al*., 2008; Brorsson *et al*., 2001).

This study had several limitations such as unable to respond, refused to respond or urgently operations that made collecting informations about the patients impossible.

Therefore, it is possible to assume that patients who dropped out have been the ones reporting the worst psychosocial functioning postoperatively. Thus finding can be questioned and results need to be generalized with caution.

A nonrandom sampling can be another potentially limitation in generalization of the findings.

The CABG is beneficial to good relief angina and improves also QOL level. Although for some patients the process of recovering after CABG and returning to optimal health is straight forward. In this line, identifying patients likely to experience improvements or impairments in their postoperative QOL can enhance the beneficial impact and the cost-effectiveness of the procedure. The clinical implication is that in patients with good QOL registration, the decision to perform CABG must clearly be discussed.

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REFERENCES

Barrya, L.C., V.K. Stanislav, J. Lichtmanb, V. Vaccarinoc and H.M. Krumholza, 2006. Social support and change in health-related quality of life 6 months after coronary artery bypass grafting. J. Psychosom. Res., 60: 185-193.

Beck, C.A., L. Joseph, P. Bélisle and L. Pilote, 2001. Predictors of quality of life 6 months and 1 year after acute myocardial infarction. Am. Heart J., 142: 271-279.

Bradshaw, P.J., K.D. Jamrozik, I.S. Gilfillan and P.L. Thompson, 2006. Asymptomatic long-term survivors of coronary artery bypass surgery enjoy a quality of life equal to the general population. Am. Heart J., 151: 537-544.

Brorsson, B., S.J. Bernstein, R.H. Brook and L. Werkö, 2001. Quality of life of chronic stable angina patients 4 years after coronary angioplasty or coronary artery bypass surgery. J. Inter. Med., 249: 47-57.

Esmaeeli, Z., N. Vaezzadeh, S.Z. Tabari and R.A. Mohammadpour, 2007. Quality of life after coronary artery bypass grafting in patients underwent cardiovascular surgery in Sari/Iran 2004. J. Mazandaran Univ. Med. Sci., 17: 170-174.

Falcoz, P.E., S. Chocron, F. Laluc, M. Puyraveau, D. Kaili, M. Mercier and J.P. Etievent, 2006. Gender analysis after elective open heart surgery: A two-year comparative study of quality of life. Ann. Thorac. Surg., 81: 1637-1643.

Favarato, M.E., W. Hueba, W.E. Bodena, N. Lopesb and C.R.S.R. Nogueiraa *et al*., 2007. Quality of life in patients with symptomatic multivessel coronary artery disease: A comparative post hoc analyses of medical, angioplasty or surgical strategies-MASS II trial. Int. J. Cardiol., 3: 364-370.

Faye, S.R., R.T. Tsuyukib, M. Hervas-Maloc, P. LeBlancd, J.A. McFetridge-Durdlee and K.M. King, 2009. The influence of coronary artery bypass graft harvest site on womens pain, functional status and health services utilization throughout the first post-operative year: A longitudinal study. Int. J. Nursing Stud., 46: 1054-1060.

Hunt, J.O., M.V. Hendrata and P.S. Myles, 2000. Quality of life 12 months after coronary artery bypass graft surgery. Heart Lung, 269: 401-411.

Järvinena, O., T. Saarinenb, J. Julkunenb, H. Huhtalad and M.R. Tarkkaa, 2003. Changes in health-related quality of life and functional capacity following coronary artery bypass graft surgery. Eur. J. Cardiothorac. Surg., 24: 750-756.

Jenkins, C.D., R.T. Jono, B.A. Stanton and C.A. Stroup-Benham, 1990. The measurement of health-related quality of life: Major dimensions identified by factor analysis. Soc. Sci. Med., 31: 925-931.

Lee, G.A., 2008. Patients reported health-related quality of life five years post coronary artery bypass graft surgery-a methodological study. Eur. J. Cardiovasc. Nurs., 7: 67-72.

Lindquist, R., G. Dupuis, M.L. Terrin, B. Hoogwerf and S. Czajkowski *et al*., 2003. Comparison of health-related quality-of-life outcomes of men and women after coronary artery bypass surgery through 1 year: Findings from the post cabg biobehavioral study. Am. Heart J., 146: 1038-1044.

Loponena, P., M. Luthera, J.O. Wistbackab, K. Korpilahtic and J. Laurikkad *et al*., 2007. Qualities of life during 18 months after coronary artery bypass grafting. Eur. J. Cardiothorac. Surg., 32: 77-82.

Markou, A.L.P., A. van der Windt, H.A. van Swieten and L. Noyez, 2008. Changes in quality of life, physical activity and symptomatic status one year after myocardial revascularization for stable angina. Eur. J. Cardiothorac. Surg., 34: 1009-1015.

Mohammadpour, R.A. and Z. Yousefi, 2008. Factor analysis of SF-36 persian version health-related quality of life questionnaire in Iran. World Applied Sci. J., 3: 548-554.

Montazeri, A., A. Goshrasebi, M. Vahdamian and B. Gandek, 2005. The short form health survey (SF-36): Translation and validation study of the Iranian version. Qual. Life Res., 14: 875-880.

Noyez, L., L.P. Athanasios and F.C.F. van Breugel, 2006. Quality of life one year after myocardial revascularization. Is preoperative quality of life important?. Interact Cardio Vasc. Thorac. Surg., 5: 115-120.

Panagopoulou, E., A. Montgomery and A. Benos, 2006. Quality of life after coronary artery bypass grafting: evaluating the influence of preoperative physical and psychosocial functioning. J. Psychosom. Res., 60: 639-644.

Penkofer, S., C.E. Ferrans, N. Fink, M.L. Barrett and K. Holm, 2005. Quality of life in women following coronary artery bypass graft surgery. Nurs. Sci. Q., 18: 177-183.

Rantanen, A., M.T. Tarkka, M. Kaunonen, M. Tarkka, H. Sintonen, A.M. Koivisto and P. Astedt-Kurki, 2009. Health-related quality of life after coronary artery bypass grafting. J. Adv. Nurs., 65: 1926-1936.

Sorensen, E.A. and F. Wang, 2009. Social support, depression, functional status and gender differences in older adults undergoing first-time coronary artery bypass graft surgery. Eur. J. Cardiovasc. Nurs., 38: 306-317.

Stafforda, L., M. Berkb, P. Reddya and H.J. Jacksona, 2006. Comorbid depression and health-related quality of life in patients with coronary artery disease. J. Psychosom. Res., 62: 401-410.

Szygula-Jurkiewicza, B., M. Zembalab, K. Wilczeka, R. Wojnicza and L. Polonskia, 2005. Health related quality of life after percutaneous coronary intervention versus coronary artery bypass graft surgery in patients with acute coronary syndromes without ST-segment elevation. 12-month follow up. Eur. J. Cardiothorac. Surg., 27: 882-886.

The WHO Group, 1998. The world health organization quality of life assessment (WHOQOL): Development and general psychometric properties. Soc. Sci. Med., 46: 1569-1585.

Tolmie, E.P., G.M. Lindsay and P. Belcher, 2006. Coronary artery bypass graft operation: Patients experience of health and well-being over time. Eur. J. Cardiovasc. Nurs., 5: 228-236.