



Original Research Article

Assessment and evaluation of health related quality of life after coronary artery bypass grafting (CABG) in a tertiary care teaching hospital

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ABSTRACT

Background: Cardiovascular disease (CVD) is a collective group of diseases that affect the functioning of heart and blood vessels. Coronary artery bypass grafting (CABG) is considered an effective treatment and is commonly used worldwide for patients with Coronary artery disease (CAD). As there is substantial decline in operative mortality with CABG over the past 30 years, quality of life (QOL) has become an important outcome to determine the benefits and risks associated with CABG.

Aims & Objectives: The aim is to assess the QOL in patients after CABG and also to determine the factors that are associated with of QOL after CABG.

Materials and Methods: A Cross sectional study was carried out for a period of 9months among 100 CABG subjects whose postoperative period was minimum 6 months. Quality of life was assessed using the SF-36 questionnaire. The data collected were scored by RAND analysis and estimated by using SPSS.

Results: Of total 100 CABG subjects, the factor gender has its effects on physical functioning, emotional role, and general health. Based on the factor age, the domains vitality and physical role are improved more in patients <60 compared to patients >60 post-CABG.

Conclusions: Quality of life is affected by CABG, especially the physical role, vitality, social functioning, and general health domains. Factors that are affecting the QOL following CABG are smoking, education, economic, marital status, and co-morbidities as measured by the SF-36 domains.

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1. Introduction

Cardiovascular disease (CVD) is a collective group of diseases that affect the functioning of heart and blood vessels. According to the World Health Organization (WHO), cardiovascular disease is the major cause for death and disability in developed countries. Approximately, it accounts for the mortality of >17.3 million deaths in 2013 and may increase to >23.6 million by 2030.¹ Coronary artery bypass grafting (CABG) is considered an effective treatment and is commonly used worldwide for patients with coronary artery disease (CAD).² Coronary artery

bypass grafting has shown incremental developments in improving better therapeutic outcomes for angina pectoris for more than 25 years.^{3,4} Coronary artery bypass grafting is a surgical procedure which improves survival among patients with multi-vessel coronary disease by minimizing the damage in coronary arteries. The procedure uses another artery or vein to reroute blood around a blockage in arteries (coronary arteries) that supply the heart with blood and oxygen.⁵

According to WHO, it is estimated that approximately 50,000 CABG surgeries in India and more than 800,000 CABG surgeries around the world are performed worldwide annually and as per The Society of Thoracic Surgeons, there

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is gradual increase in these numbers and around 1.5.^{6,7} Traditional evaluation of CABG outcomes has focused on objective measures such as mortality, morbidity, and clinical function to assess therapeutic interventions.⁸ As there is substantial decline in operative mortality with CABG over the past 30 years, quality of life (QOL) has become an important outcome to determine the benefits and risks associated with CABG and assist patients to make better informed treatment decisions.⁹

Quality of life is the patient's perception of change in their aspects of health surrounding the surgical procedure and is the degree to which an individual is healthy, comfortable, and able to participate in the routine work or enjoy life events.¹⁰ It is assessed to gain a better understanding of health benefits in an individual. Pharmacologic therapy and non-medical variables (i.e. psychological changes, economical status, educational level, and region of residence) and many other factors such as gender, diabetes mellitus, low ejection fraction, sleep, etc., are related to changes in QOL after CABG. Hence, information about the factors affecting QOL after CABG can be useful to determine prognosis and to eliminate or minimize modifiable factors. The physical, mental, and social aspects are the three important aspects of QOL in CABG.¹¹ The SF-36 questionnaire helps to measure the eight health constructs (i.e. physical functioning (PF), role physical (RP), bodily pain (BP), general perception of health (GH), energy and vitality (VT), social functioning (SF), emotional role functioning (RE), and mental health (MH)).^{(12),(13)} These measures allow the patient's own perspective to identify the aspects contributing most to their overall QOL.

Even though health-related quality of life (HRQOL) after CABG surgery has been studied extensively using a variety of generic and disease specific HRQOL instruments, the results obtained have not been consistent.¹² Recent studies have shown no clear relation between factors and QOL changes after CABG.¹³ Hence, this study was initiated to assess the HRQOL after CABG and to determine the factors that are affecting the QOL after CABG.

2. Materials and Methods

2.1. Study design and data collection

This is a cross-sectional study which was carried out for a period of 9 months in patients who underwent coronary artery bypass grafting (CABG) at Dr. Pinnamaneni Siddhartha Institute of Medical Sciences & Research Foundation, Andhra Pradesh, India. A total number of 100 patients were recruited in the study. The study patients represented a convenience sample of all patients who underwent the CABG surgery during the 9 months period () meeting the Inclusion criteria: post-operative period of minimum 6 months, above 18 years old, having the

ability to speak. Patients who underwent any previous cardiac, thoracic, aortic or vascular procedures other than CABG recently underwent CABG (i.e. less than 1 month), Unresponsive and /or non-communicative patients, Oncology patients and Pregnant women were excluded from the study. All the patients agreed to participate with written consent form under the approval of Institutional Ethics Committee. Protocol Approval No. was UG/351/18.

Pre-operative and post-operative data were collected from patient's case profiles and through interviewing the patient, either in person or through contact. The functional, psychological, social status, and physical status of the patients after CABG were assessed using the short form, 36 questions (SF-36) general health status survey which was one of the best way to monitor patient's HRQOL as it serves as a validated survey instrument that is easy to complete, process, and score (scoring by RAND 36- item health survey).

2.2. SF-36 questionnaire

The SF-36 is a validated survey indicating overall health status. It helps to monitor patient's HRQOL variables as it is quickly available and is easy to complete, process, score, and sensitive enough to detect changes in pain, function, and overall health status at follow up and consists of 36 multiple choice questions. A suitable data collection form was designed (includes SF-36 questionnaire) for use in the study. All the necessary data including the patient's demographic details (age, sex), socioeconomic, social history (smoking, alcohol consumption), family history, co-morbidities were collected from clinical records and the patient's functional status, psychological status, social status, physical status after CABG were assessed by interviewing the patient using SF-36 questionnaire by prior consent of the participant.

3. Data analysis

Data collected were scored by RAND 36-Item Health Survey in a two-step process. Step 1, scores were converted to a 0-100, which allowed us to measure the scales numerically. High values of 0–100 for each health domain indicate better health status. Step 2, average will be performed for the items in the same scale together to create the 8 scale scores. The lowest scores indicate the lowest state of health with functional, social and role abnormality and distress. Statistical analyses performed using Graph pad prism software (version 5.0). Data were summarized by number/percentage and Mean \pm SD. Unpaired-test and one-way variance were used to compare groups for continuous variables. Where, $p < 0.05$ was considered as statistically significant.

4. Results

Table 1 illustrates the socio-demographic characteristics of the 100 participants and they are the main factors that contribute to the development of coronary artery disease and may increase the chances of the patient receiving a CABG. The risks for smokers (54%) are slightly higher than non-smokers.

The SF-36 questionnaire was divided into eight variables/domains such as physical functioning, physical role, emotional role, vitality, mental health, social functioning, pain, and general health. Table 2 explains the means and standard deviations of the domains. The variables with higher means are: physical functioning (79.15 +1.6), mental health (77.49 + 1.6). In comparison, the least scores are observed in physical role (59.50 +1.2), vitality (61.06 +1.2) and social functioning (65.72 + 1.3).

The mean score for the variables according to the factors (age, gender, and family status) are mentioned in Table 3. Gender (found less in female than in male) has its effects on physical functioning ($P=0.0214$), emotional role (0.0078), and general health (<0.0001). Considering the factor age, the domains vitality ($P=0.0007$) and physical role ($P=<0.0001$) vary greatly when compared to other domains, indicating that physical role and vitality are improved more in patients <60 compared to patients >60 post-CABG. In this study, single subjects had lower mean values in all 8 domains compared to married subjects. Marital status had mostly affected the physical functioning domain (P value of 0.0122).

Under the consideration of other factors such as educational status, occupation, co-morbidities, and smoking (Table 4), the co-morbidities observed in this study population are Hypertension (56%), Diabetes Mellitus (23%), Hyperlipidemia (16%), COPD (3%) and renal dysfunction (2%) and the patients having more than one co-morbidities have less score in the domain vitality. Our study also indicates that the QOL for smokers was less in comparison to non-smokers. In this study, educational status had shown a significant effect on physical functioning and emotional role, with the remaining domains showing non-significance. This indicates that those who are uneducated have less physical stress over work and better QOL than those who are educated. The means for the mental health domain ($P=0.0002$) and social functioning ($P=0.0135$) are lower in unemployed participants due to the lack of activities and idle life-style choices. Unemployment and lower socio-economic status have been associated with poorer mental QOL.

5. Discussion

Quality of life is complex and it is defined as a multi-dimensional assessment of an individual's perception of the physical, social and psychological aspects that are affected

Table 1: Socio-demographic characteristic of the participants

| Characteristics | Study Population | Frequency % |
|-------------------|------------------|-------------|
| Gender | | |
| Male | 69 | 69% |
| Female | 31 | 31% |
| Age in years | | |
| <60 | 62 | 62% |
| >60 | 38 | 38% |
| Marital status | | |
| Married | 82 | 82% |
| Widow | 13 | 13% |
| Divorced | 5 | 5% |
| Education level | | |
| Primary | 17 | 17% |
| Secondary | 61 | 61% |
| Graduation | 17 | 17% |
| Uneducated | 5 | 5% |
| Employment status | | |
| Employed | 70 | 70% |
| Unemployed | 30 | 30% |
| Co-Morbidities | | |
| < 1 | 56 | 56% |
| >1 | 44 | 44% |
| Smoking | | |
| Yes | 46 | 46% |
| No | 54 | 54% |

Table 2: Mean scores of variables

| Variables | Mean \pm SD |
|----------------------|-----------------|
| Physical Functioning | 79.15 \pm 1.6 |
| Physical Role | 59.50 \pm 1.2 |
| Emotional Role | 74.99 \pm 1.5 |
| Vitality | 61.06 \pm 1.2 |
| Mental Health | 77.49 \pm 1.6 |
| Social Functioning | 65.72 \pm 1.3 |
| Pain | 74.90 \pm 1.5 |
| General Health | 65.92 \pm 1.3 |

by the disease and its treatment. The coronary artery bypass grafting has its impact on physical, mental health and quality of life. Various studies on investigating the factors that affected the quality of life have demonstrated there is relationship between quality of life and psychosocial, demographic factors and patient related characteristics.

In this study the majority were male i.e., male patients (69%) and (31%) female patients this is consistent with a study conducted by Thamer Menwer Albilasi et al., It is an expected outcome because males are at higher risk of suffering from coronary artery disease (high percentage of the patients are below 60 years (62%)) and to undergo this type of surgery.¹⁴ In this study, among 100 subjects, the mean scores of the SF-36 subscales varied between 59 & 79. The study has higher scores for physical functioning, mental health, emotional role, and pain whereas the least scores were observed in general health, vitality, role physical and

Table 3: Factors and its influence on the domains of quality of life

| Domains of Hrqqol | Age | | Gender | | Family status | | | P Value | | |
|----------------------|---------------|---------------|---------|-----------|---------------|-----------|----------|----------|----------|--------|
| | Mean + SD >60 | Mean + SD <60 | P Value | F | M | Mean + SD | W | | | |
| Physical Functioning | 77.2±1.5 | 80.2±1.6 | NS | 77.8±1.5 | 81.9±1.6 | NS | 81.5±1.6 | 61±1.2 | 70.7±1.4 | 0.0122 |
| Physical Role | 36.4±0.7 | 65.4±1.3 | <0.0001 | 53.4±1.06 | 70.9±1.4 | 0.0214 | 62.5±1.2 | 50.0±1.0 | 40.3±0.8 | |
| Emotional Role | 74.3±1.4 | 75.3±1.5 | NS | 68.7±1.3 | 86.6±1.8 | 0.0078 | 77.4±1.5 | 83.2±1.6 | 56.4±1.1 | |
| Vitality | 53.3±1.06 | 65.4±1.3 | 0.0007 | 62.4±1.2 | 57.8±1.1 | NS | 61.2±1.2 | 56.2±1.1 | 61.5±1.2 | |
| Mental Health | 73.8±1.4 | 79.6±1.5 | NS | 76.8±1.5 | 77.1±1.5 | NS | 78.1±1.5 | 76.4±1.5 | 74±1.4 | |
| Social Functioning | 66±1.3 | 65.5±1.3 | NS | 66.6±1.3 | 61.8±1.2 | NS | 65.4±1.3 | 65.2±1.3 | 67.7±1.3 | |
| Pain | 73.1±1.4 | 75.9±1.5 | NS | 74.5±1.5 | 75.3±1.5 | NS | 77.3±1.5 | 64.2±1.2 | 63.6±1.2 | |
| General Health | 67.1±1.3 | 65.1±1.3 | NS | 61.5±1.2 | 74.6±1.5 | <0.0001 | 65.9±1.3 | 60.1±1.3 | 68.0±1.3 | |

F=Female; M=Male; W=Married; D=Divorced; W=Widow.

Table 4: Factors and its influence on the domains of quality of life

| Domains of Hrqqol | Educational Status | | | Occupation | | | Co-morbidities | | | Smoking | | |
|----------------------|--------------------|-----------|-----------|------------|--------|-----------|----------------|----------|---------|-----------|----------|---------|
| | UE | PE | HS | TE | E | UE | >1 | <1 | P | Y | N | P |
| Physical Functioning | 78±1.5 | 65.2±1.3 | 83.6±1.7 | 77.3±1.5 | 0.0035 | 78.8±1.6 | 79.1±1.6 | 78.8±1.6 | NS | 76.5±1.5 | 81.0±1.6 | NS |
| Physical Role | 70±1.4 | 52.9±1.05 | 58.6±1.2 | 66.1±1.3 | NS | 55±1.1 | 83±1.7 | 59.5±1.2 | NS | 52.1±1.04 | 65.9±1.3 | NS |
| Emotional Role | 86.8±1.7 | 57.4±1.1 | 80.6±1.6 | 49.8±0.9 | 0.0048 | 73.7±1.4 | 77.8±1.5 | 78.4±1.6 | NS | 64.8±1.3 | 83.6±1.7 | 0.0067 |
| Vitality | 70.4±1.4 | 62.2±1.2 | 60.3±1.2 | 59.5±1.2 | NS | 62.7±1.25 | 57.1±1.1 | 69.4±1.3 | <0.0001 | 61.8±1.2 | 60.3±1.2 | NS |
| Mental Health | 76±1.5 | 73.8±1.4 | 80.1±1.6 | 72±1.4 | NS | 79.3±1.6 | 64.0±1.3 | 79.0±1.6 | NS | 76.5±1.5 | 78.2±1.6 | NS |
| Social Functioning | 65.6±1.3 | 62.4±1.2 | 67.7±1.35 | 61.5±1.2 | NS | 68.2±1.4 | 55.9±1.1 | 74.6±1.5 | NS | 55.8±1.1 | 74.1±1.5 | <0.0001 |
| Pain | 79.8±1.6 | 63.2±1.2 | 77.9±1.5 | 74.1±1.4 | NS | 76.6±1.5 | 70.8±1.4 | 76.0±1.5 | NS | 73.3±1.5 | 76.2±1.5 | NS |
| General Health | 71±1.4 | 59.4±1.1 | 67.9±1.35 | 63.8±1.3 | NS | 63.9±1.3 | 70.5±1.4 | 69.7±1.4 | NS | 56.6±1.1 | 73.8±1.5 | <0.0001 |

UE= Uneducated; PE= Primary Education; HS= High School; TE= Technical Education, E=Employed, UE= Unemployed.

social functioning. The scores of all the subscales in this study are similar to the study conducted by Grace M. Lindsay et al., evaluated for 1 year and had lower scores for most of the subscales of SF-36, compared to a study conducted by Rosana Aparecida et al., evaluated patients 2.6 years after surgery.¹⁵ This observed difference may have happened because of the longer follow-up time after surgery. However, similarities in some subscales show that scores of some of the domains such as physical functioning and mental health will not change with time.

Based on the factor age, there is growth in health domains physical role and vitality in patients less than 60 years in consistent with the study of QOL in elderly patients following coronary artery bypass grafting by EwelinaBak et al., 'Because the people with less than 60 years of age usually possess good physical condition, mental function, improvement in the cardiac status and the lower incidence of comorbidities than elderly patients. Although, the elderly gain benefit from CABG in the aspect of QOL and survival after surgery because of their unmet physical role and vitality the QOL will be poorer when compared with younger patients.¹⁶

Considering the factor gender, physical functioning and general health were improved in men and emotional role was lower in women than in men consistent with the study conducted by Vaccarino V, et al., where women showed on an increase in depressive symptoms when compared to male these differences in emotional role can be explained through the variation in the social functions, responsibilities of the household. Women may feel greater burden than men when they cannot perform their role effectively after surgery. The general health, physical functioning are effected in women due to the poor prognosis of CAD in women than in men.¹⁷ Single subjects have less improvement in health when compared to the married subjects in consistent to the studies done by Hadi A.R. Hadi Khafaji FRCP et al., who explained this association as women who were divorced/widowed/single due to lack of support cannot perform their physical functioning effectively after CABG and are likely to have lower hope.¹⁸ Hence, post-operative decreased QOL can be associated with diminished hope.

Similar to the study by Maria Lavdaniti et al., presence of more co-morbidities influenced the improvement in vitality. In our Study the multimorbidity was observed more in elderly patients than in younger that may be one of the reasons for change in QOL. However, patients with relatively good preoperative health status are likely to have QOL benefit from surgery and the operation should be performed primarily by controlling these co-morbid conditions to improve survival.¹⁹ Smoker subjects have less quality of life when compared to non-smokers. Emotional role, social functioning and general health show significance with higher scores in non-smoker participants. It is supported by the study of Ron T van Domburg et al.,

where emotional role and physical role were affected by the smoking factor in those who continued to smoke after CABG.²⁰ Patients who continued to smoke after CABG had a greater risk of death than patients who stopped smoking. Cessation of smoking is therefore strongly recommended before and even after CABG.

Emotional role and physical functioning are influenced by educational status. Similar to the findings of Bostan et al. where that patients with lower education levels had higher social component QOL scores. This difference may be accounted for, in part, by the impact of education (and class) on patient's expectations.²¹ It seems that the patients with higher levels of education were less satisfied with themselves and their personal relationships, as well as, other domains of social functioning in comparison to patients with lower levels of education due to the lack of awareness on the disease, surgery, and its outcomes. On considering the occupation status of the population, the mean of physical role is higher in unemployed participants due to their less physical activity than employed participants. In addition, the unemployed had less complaints post-surgery compared to the employed.

6. Conclusion

Quality of life (i.e. the patient's perception on the changes in their state of health surrounding the surgical procedure) is affected by CABG, especially the physical role, vitality, social functioning, and general health domains. This information on health outcome can be incorporated into clinical decision-making to avoid an over-optimistic expectation of health status after surgery. Factors that are affecting the QOL following CABG are smoking, education, economic, marital status, and diabetes mellitus as measured by the SF-36 domains. This finding provides an important new opportunity for identification of patients who are less likely to attain maximum benefit from CABG. Hence, interventions may be designed to improve a patient's social context prior to CABG and help to improve the health outcome post-operatively.

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9. Conflict of Interest

None.

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