Title: Quality of life of patients after cardiac surgery in the Western Region of Saudi Arabia

Running title: quality of life of patients after cardiac surgery

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Abstract:

Background: Cardiovascular diseases (CVDs) are the number one cause of death globally, representing 31% of global deaths in 2016. Quality of life (QoL) is used as a criterion for treatment outcome evaluation in cardiology. This study aims to explore patients' quality of life who underwent open cardiac surgeries in King Faisal Cardiac Center-King Abdulaziz Medical City-Western Region of Saudi Arabia during 2015-2017.

Methods:
A cross-sectional retrospective study was done at King Faisal Cardiac Center. A convenient sample was used by identifying all patients who underwent open cardiac surgery between the period of June 2015 till May 2017. 163 subjects were eligible for our study, of which 94 were valid for analysis. The participants received the SF-36 questionnaire, proven to evaluate the quality of life; The survey is divided into 8 significant domains reported as mean scores. The correlation was done using the Mann-Whitney U test, using a cutoff p-value of 0.05.

Results:
The results revealed that subscales of physical functioning, role limitations due to physical problems, and role limitations due to emotional problems were the lowest means of the eight domains of QOL. However, the mental health / emotional well-being and the pain subscales were the highest of them all.

Conclusion:
The present study results indicate that the quality of life of patients who underwent cardiac surgery is negatively affected. The immediate postoperative duration is a vital factor that impacts the long-term quality of life; therefore, hospital services need to increase their efforts regarding this critical period.

Keywords: Quality of Life, patients, Cardiac Surgery, Western Region, Saudi Arabia
Background:

Cardiovascular diseases are among the most prevalent diseases and the most common cause of death worldwide [1]. Cardiovascular disease is used as a general term describing any condition affecting the heart muscle, the valves, the rhythm, or the blood vessels. According to what CDC published in 2020, coronary artery disease is the most common type of heart disease in the United States. Also, high blood pressure, since CDC has stated that nearly half of the adults in the United States are diagnosed with hypertension. Plus, half a million deaths every year are associated with hypertension. While in Saudi Arabia, according to what the Ministry of Health (MOH) has published in 2017, the prevalence of hypertension tends to increase with age. It can reach up to 70% among those aged 65 or older. Exposure to multiple risk factors, including Aging, obesity, diabetes, and smoking, is widespread of cardiovascular diseases [2, 3]. This elevation in cardiovascular diseases directly influences the rate of death, as according to the statistical yearbook by MOH 2016, 7740 deaths were occurring due to circulatory system defects in Saudi Arabia.

It has been noticed that a patient dies because of acute coronary heart disease in the United States of America [4]. To prevent death, there are multiple ways to treat heart diseases, including cardiovascular surgery procedures, which are divided into two types: traditional and non-traditional [4, 5]. Traditional procedures include open-heart surgery, such as Coronary Artery Bypass Grafting (CABG) and valve heart replacements. The non-traditional procedures include percutaneous coronary intervention (PRI), off-pump coronary artery bypass grafting, and minimally invasive direct coronary artery bypass grafting [4, 5]. According to the Ministry of Health (MOH, 2016), there had been 10140 cardiac surgery interventions in MOH hospitals alone. CABG is the gold standard and the most commonly
successful cardiac surgery for relieving the blockage in coronary arteries or veins [4]. Like every other surgery, cardiac surgeries are associated with significant risks and complications, which may affect the patient's life. This depends on many factors, including demographic characteristics, ejection fraction, length of ICU stay, number of diseased vessels, smoking history, myocardial infarction (MI) history, diabetes, and involvement of left coronary artery [6, 7]. In postsurgical cardiac procedures, the decrease in mortality and the increase in morbidity has dramatically lowered patients' quality of life, which encouraged researchers to focus more on quality of life (QOL) [8]. Quality of life is considered multidimensional because of its wide contents, including physical, functional, emotional, and social well-being [8-12]. So, survived patients will be assessed by SF-36 to evaluate their quality of life. The results of this questionnaire can be used to inform critical information about treatment efficacy and clinical decision-making [13, 14].

A poor QOL score on the few days following surgery forecasts a poor QOL 3 months after surgery [15]. According to Stoll et al., post-operative cardiac patients showed a lower physical function and mental health when compared to same-sex and age-healthy individuals [16]. According to Nicholas Curcio, mental health has significantly affected the quality of life. They found that anxious patients differed from non-anxious patients in the score of physical limitations. Moreover, depressed patients were also found to have lower scores in the quality of life than non-depressed patients [17].

Furthermore, it has been proven that preoperative and postoperative depressive symptoms for two months predict worse physical and psychosocial functioning at 6 months [18]. According to a study published in 2019, using the SF-36, they found that the physical functioning was significantly higher in 5 years of the surgery and significantly lower in 10 years [14]. Also, 20% of cardiac surgery patients showed declining QOL after the surgery, although the procedures were successful [19]. Multiple researches were done regarding
patients' quality of life following cardiac surgery; however, none of them were conducted in Saudi Arabia or the Gulf region. This research aims to explore the quality of life, and it is an association to the demographic characteristic and survival rate of patients following cardiac surgeries in Saudi Arabia. We aim to explore patients' quality of life who underwent cardiac surgeries in King Faisal Cardiac Center- King Abdulaziz Medical City -Western Region of Saudi Arabia from 2015 to 2017.

**Subjects and Methods:**

The study was conducted at King Faisal Cardiac Center at King Abdul-Aziz Medical City, Ministry of National Guard Heal Affairs. King Faisal Cardiac Center has 67 beds to provide medical and surgical cardiac health services. King Faisal Cardiac Center has several outpatient clinics with around 15,000 visits per year. The cardiac clinics include general adult cardiology, cardiac surgery, device clinic, heart failure clinic, and arrhythmias clinic. The total number of surgeries performed at King Faisal cardiac center is around 150 surgeries per year. Adult patients undergone cardiac surgery from 2015 till 2017. A quantitative, retrospective, cross-sectional study. The study includes two parts; the first was a retrospective review of patients' records to collect data about the sociodemographic, health-related, and cardiac surgery-related data. The second part was a cross-sectional survey distributed to collect data about QOL. The targeted population was approached via phone calls. They were invited to participate voluntarily in the study. If agreed, they were offered to fill a questionnaire through phone or an online survey, whatever the participant prefers. In the case they chose a phone interview, informed consent was verbally obtained with a witness who was not part of the research, then the participants were verbally asked the survey questions. On the other hand, if the participant chooses to fill an online survey, they receive an informed consent form through WhatsApp or email.
A convenient sample of available cases that have undergone open cardiac surgeries from June 2015 till May 2017 at King Faisal Cardiac Center was invited to participate in the study. A total of 241 underwent open cardiac surgery. Seventy-eight were excluded due to death, moving outside the country, or changing phone numbers. The remaining one hundred sixty-three patients were invited to participate in the study. Two tools were used: Datasheet with survival data, developed by researchers after an extensive literature review that includes: demographics, health-related data, past medical history, surgical history, hospital admission and outcome at one year. The SF-36 questionnaire evaluated patients' quality of life after open cardiac surgery. The SF-36 is a multidimensional survey based on eight domains covering the individual's physical, mental, and social life. Answers were then converted to a 0-100 scale for each health domain, where higher values indicate better health status. The internal consistency of the questionnaire was checked by Cronbach’s alpha and proved to be good (Cronbach’s alpha=0.89).

The SF-36 is a 36-item questionnaire that measures eight multi-item dimensions of health; physical functioning (10 items), social functioning (2 items), role limitations due to physical problems (4 items), role limitations due to emotional problems (3 items), mental health (5 items), energy/vitality (4 items), pain (2 items), and general health perception (5 items). For each dimension, item scores are coded, summed, and transformed on a scale from 0 (worst possible health status measured by the questionnaire) to 100 (best possible health status). Two standardized summary scores were also calculated from the SF-36; the physical component summary (PCS) and the mental health component summary (MCS).

In 1996, a new version of the questionnaire (SF-36v2) was introduced, which included improvements in the instructions, the wording of some of the items, and the number of response options for two of the eight scales. Several general population studies have
confirmed the improved precision, reliability, and validity of the SF-36v2 over the original version. Version 2.0 of the SF-36 Health Survey is a product of fifteen years of research and the experience documented in a wide variety of publications.

Data were managed and analyzed using Statistical Package for the Social Sciences (SPSS) 25. Variables were presented in numbers, frequencies, means, and Standard Deviations or medians and quartiles as appropriate. The mean score for different domains of the SF 36 questionnaire was calculated for all subjects, and comparisons were made with the different patients' demographic factors. Comparison of categorical and continuous data was analyzed with T-test statistics, while categorical data was made with chi-square as indicated. A p-value with a cutoff of 0.05 was used as the significant cutoff level.

Approval of this study was obtained from the Human Subject Board of King Abdullah International Research Center and from the Human Subject Board of King Abdulaziz Medical City to protect participants. Participants' right was promoted based on the ethical principles of respect for humans, the right to fair treatment and privacy and confidentiality, and the principles of autonomy [20]. All participants received an invitation letter and an informed with each questionnaire ensuring that the participation was voluntary. This letter contains the purpose of the study, research procedure, and a guarantee to maintain anonymity and confidentiality of the information. The subjects were offered a phone interview or an online form. If they chose a phone interview, consent would be verbally obtained with a witness who is not a part of the research; then, they will be verbally asked the questionnaire questions.

On the other hand, if the participant chooses to fill an online survey, they will be sent an informed consent form and the survey through WhatsApp or email. No names will be disclosed in any questionnaire, and they will be filled anonymously. Data will be stored in a
well-protected computer secured by different cyber firewalls. This data will be accessed only by researchers participating in the study.

**Results:**
A total of 241 underwent open cardiac surgery. Seventy-eight were excluded due to death, moving outside the country, or changing phone numbers. One hundred sixty-three patients were invited to participate in this study. Ninety-four patients agreed voluntarily to participate in this study. The response rate was 58%.

**Demographic Characteristics of participants:**
The mean age of participants was 60 years. Three fourth of the participants were male. The majority were married and not employed. Table 1 shows data on demographics.

**Table 1:** Demographic Characteristics of Study participants:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Mean (+ or – S. D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>60.62 (11.27)</td>
</tr>
<tr>
<td>Gender (N, %)</td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>72 (76.6%)</td>
</tr>
<tr>
<td>Female</td>
<td>22 (23.4%)</td>
</tr>
<tr>
<td>Employment Status (N, %)</td>
<td></td>
</tr>
<tr>
<td>Employed</td>
<td>12 (12.8%)</td>
</tr>
<tr>
<td>Other</td>
<td>79 (84.1%)</td>
</tr>
<tr>
<td>Marital Status (N, %)</td>
<td></td>
</tr>
<tr>
<td>Married</td>
<td>86 (91.5%)</td>
</tr>
</tbody>
</table>


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<tr>
<td>Other</td>
<td>8 (8.5%)</td>
</tr>
</tbody>
</table>

**Health-Related Data:**

Results indicated that participants' BMI was 29.9. Three-fourths of participants were Diabetics, more than 80% were hypertensive, and more than two-thirds were known to have a history of IHD. The type of cardiac surgery participants underwent was mainly CABG (80.9%), while only 18.1 underwent other types of cardiac surgery. Table 2 shows the results of the health-related data.
Table 2: Health-Related Data of Study participants:

<table>
<thead>
<tr>
<th>Categories</th>
<th>Mean (S. D.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BMI (N, %)</td>
<td>29.95 (5.56)</td>
</tr>
<tr>
<td>Diabetes (N, %)</td>
<td>74 (78.7)</td>
</tr>
<tr>
<td>Hypertension (N, %)</td>
<td>76 (80.9)</td>
</tr>
<tr>
<td>History of IHD (N, %)</td>
<td>63 (67%)</td>
</tr>
<tr>
<td>Type of Surgery (N, %)</td>
<td></td>
</tr>
<tr>
<td>CABG</td>
<td>79 (80.9%)</td>
</tr>
<tr>
<td>Other</td>
<td>18 (18.19%)</td>
</tr>
</tbody>
</table>

Types of Cardiac surgeries:

Results of this study found that most of the cardiac surgery performed at King Faisal Cardiac Center was mainly CABAG 76 (80.9%), valve replacement 13 (13.8%), and the remaining were pacemaker and pericardiectomy. Figure 1 shows the result of the types of surgery.
Quality of life of participants:

The results of the SF-36 questionnaire are presented in Table 3, arranged in descending way. Results showed that participants scored high in the Mental health / Emotional Well Being domain (Mean = 71.1), followed by Pain domain (Mean = 68.1), then Social functioning (Mean = 65.8), and general health perception (Mean = 61.8). A relatively low score in the Energy/vitality domain (Mean = 57.1) and Physical functioning domain (Mean = 56), while the lowest domains were role limitations due to physical Problems (Mean = 41) and role limitations due to emotional problems domain (Mean = 35.5).
Correlation between participants' demographics and health-related characteristics and the QOL Domains:

Parametric and Non-Parametric tests were done to test the correlation between participants' demographics and health-related characteristics and the eight domains of QOL. Results indicated no statistically significant correlations between the QOL domains and gender, marital status, education level, or employment status (P ≥ 0.05). However, it was found that there was a statistically significant correlation between age and four domains of QOL, namely, physical function, role limitation of physical health, energy

<table>
<thead>
<tr>
<th>Domain</th>
<th>Mean</th>
<th>Std. Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mental health / Emotional Well Being (5 items)</td>
<td>71.1</td>
<td>24.2</td>
</tr>
<tr>
<td>Pain (2 items)</td>
<td>68.1</td>
<td>30.7</td>
</tr>
<tr>
<td>Social functioning (2 Items)</td>
<td>65.8</td>
<td>32.9</td>
</tr>
<tr>
<td>General health perception (5 items)</td>
<td>61.8</td>
<td>23.4</td>
</tr>
<tr>
<td>Energy/vitality (4 items)</td>
<td>57.1</td>
<td>26.6</td>
</tr>
<tr>
<td>Physical functioning (10 Items)</td>
<td>56</td>
<td>29.5</td>
</tr>
<tr>
<td>Role limitations due to physical problems (4 items)</td>
<td>41</td>
<td>42.4</td>
</tr>
<tr>
<td>Role limitations due to emotional problems (3 items)</td>
<td>35.5</td>
<td>45</td>
</tr>
</tbody>
</table>

Table 3: Domains of Quality of Life of participants

Discussion

This study explores patients' quality of life who underwent cardiac surgery. Participants of this study are in the overweight range (mean BMI = 29.95). Overweight and obesity were significantly associated with developing CVD at an earlier age and associated with increased risk of cardiovascular morbidity and mortality compared with normal BMI [21, 22]. The
prevalence of diabetes, hypertension, and IHD is very high in the participating patients. These three diseases were considered the highest risk factors for CVD globally [3, 23, 24].

Although cardiac surgery is expected to positively affect both physical and mental components of quality life, the results of this study indicated that the eight domains of QOL are scored between 71 and 35. A study carried by Kurfirst et al. (2014) revealed similar results, while another study that followed patients for ten years after cardiac surgery revealed a positive result on the QOL [13, 14]. Some studies have compared QOL before and after cardiac surgery and found very minimal difference in some domains of QOL [14, 25-27].

Compared to normative values obtained from medical outcomes study done by SF-36, lower scores were detected on the mean scores of the physical functioning domain, role limitations due to physical Problems domain, and the role limitations due to emotional problems domain scored low. This result is congruent with Tabesh et al. (2015), except for their study, there were improvements of QOL domains after cardiac surgery [28]. Low QOL may impair daily activities, leading to decreased life satisfaction and emotional deterioration [29].

Participants ’demographic characteristics in this study had no significant correlation with the QOL Domains except age. Araujo et al. (2017) indicated that QOL domains were significantly associated with the demographic characteristics of patients. Regarding the health-related characteristics, the result of this study is similar to other studies as Dabek et al. (2017) and Araujo, et al. (2017), where QOL domains were significantly correlated to health problems or diseases as diabetes and hypertension [25, 29]. Since these factors are high in the Saudi Community, lifestyle modification before and after cardiac surgery will improve QOL [30].

The result of this study may be attributed to many factors affecting patient who underwent cardiac surgery, including lack of well-developed and structured cardiac
rehabilitation programs, lack of awareness regarding risk factors and lack of well-structured lifestyle modification programs,

On the other hand, bodily pain, general health, and social functioning differed from Iran’s research1. Only one domain was similar in both, which is energy and fatigue.

**Conclusion**

The present study results indicate that the quality of life of patients who underwent cardiac surgery is negatively affected. The immediate postoperative duration is a vital factor that impacts long-term quality of life; therefore, hospital services need to increase their efforts regarding this critical period. Further studies should be conducted to explore more regarding the reasoning.

**List of Abbreviations:**

CABG Coronary Artery Bypass Grafting  
CVD Cardiovascular diseases  
MCS Mental health component summary  
MOH Ministry of Health  
PCS Physical component summary  
QOL Quality of Life  
SPSS Statistical Package for the Social Sciences

**Conflict of interest:**  
The authors declare that there is no conflict of interest regarding the publication of this article.

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**Consent to participate:**  
Written informed consent was obtained from all the participants.

**Ethical Approval:**  
Ethical approval for the present study was granted by [Provide institution name, approval number and date of approval]
References:


4. Kulik A: Quality of life after coronary artery bypass graft surgery versus percutaneous
https://doi.org/10.1097/HCO.0000000000000458

https://doi.org/10.3889/oamjms.2017.057

https://doi.org/10.1161/01.CIR.90.6.2645

https://doi.org/10.1111/j.1540-8191.2005.200413.x


https://doi.org/10.3109/07357909309024860

https://doi.org/10.1016/0891-4222(94)00028-8

https://doi.org/10.1590/S1516-44462003000100007

https://doi.org/10.1016/0885-3924(94)90129-5


https://doi.org/10.1186/s12955-019-1160-7

https://doi.org/10.1097/00000542-200110000-00013


