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Original scientific paper

Assessment of the Quality of Life of Patients Following Cardiac Surgery

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Abstract

Aim. To assess the quality of life of patients following cardiac surgery and to analyze differences in quality of life based on gender, age, diagnosis, and the associated comorbidities.

Methods. A cross-sectional study was conducted at the Clinical Hospital Center Osijek, Clinic for Surgery, Department of Cardiac and Thoracic Surgery, during March, April, and May of 2024. The study included a total of 41 respondents who underwent a cardiac surgery more than six months prior. The SF-36 health questionnaire was used.

Results. The study included 41 respondents, 27 (66%) males and 14 (34%) females. The examination of disease characteristics showed that 59% of respondents took medication for hypertension, while 34% of respondents took medication for diabetes. There were no significant differences in the quality of life of between respondents with hypertension and diabetes. The respondents who underwent combined surgery had significantly poorer physical and social functioning, and experienced more pain compared to those who had mitral valve surgery.

Conclusion. The quality of life of respondents following cardiac surgery is the lowest in the subscale of physical limitations, with no significant difference based on gender. The respondents in the older age group had lower physical functioning, vitality, and energy, and they reported a higher level of pain compared to younger participants.

Introduction

World Health Organization defines health as physical, mental, and social well-being. Quality of life refers to people's ability to function normally in daily life and feel satisfied with their participation in everyday activities (1). After undergoing cardiac surgery, patients often report pain, discomfort, feelings of depression, impatience, and a loss of overall well-being. Such feelings can significantly impair a patient's quality of life. In recent decades, the proportion of older adults in the European Union has increased, leading to a rise in the number of cardiac surgeries performed on elderly patients. With advancements and the introduction of new surgical techniques, lower mortality and morbidity rates have been observed in older patients (2). The results of some studies conducted in Croatia showed that a year after undergoing cardiac surgery, patients' health significantly improved compared to their condition before surgery (3).

Cardiovascular diseases

Cardiovascular diseases are one of the leading causes of illness and death worldwide. According to the World Health Organization, approximately 17.9 million people die from cardiovascular diseases each year globally. Moreover, it is estimated that by the year 2030, this number will have risen to 23 million per year (4). Within the cardiovascular system, a wide range of diseases and health conditions may occur. Cardiovascular disease of the heart refers to four entities: coronary artery disease (ischemic heart disease), cerebrovascular disease, peripheral arterial disease, and aortic atherosclerosis (5). Coronary artery disease is one of the leading causes of reduced quality of life, disability and death worldwide. It is the most common cardiovascular disease, developing as a result of an atherosclerotic plaque in the lumen of a blood vessel, and it represents a condition in which the coronary arteries are narrowed or blocked (6, 7). Coronary artery disease is classified into two main groups: stable ischemic heart disease and acute coronary syndrome. Acute coronary syndrome encompasses conditions such as acute myocardial infarction with ST-elevation (STEMI), acute myocardial infarction without ST-elevation (NSTEMI), and unstable angina pectoris (7).

Risk factors

Risk factors of developing cardiac diseases are diverse and include both modifiable and non-modifiable factors. Non-modifiable factors include gender, age, family history and genetics. Modifiable factors include smoking, obesity, lipid levels, and environmental factor. Unhealthy diet, physical inactivity and smoking are major risk factors for heart disease. Accelerated pace of life, the characteristic of modern world, has led to frequent consumption of fast and unhealthy food, which, combined with a sedentary lifestyle, has contributed to the increased incidence of ischemic heart disease in the population. A higher risk of developing heart disease is associated with male gender, diabetes, hypertension, hypercholesterolemia, and dyslipidemia (8, 9).

Diagnosis and treatment

Diagnosis is based on collecting medical history and conducting a detailed physical examination. Depending on the assessment, further diagnostic tests may be performed. The diagnostic process includes an electrocardiogram (ECG), echocardiography, radiographic imaging, stress testing, cardiac catheterization, and blood laboratory tests (7).

Treatment depends on the characteristics and severity of the disease itself. While treatment varies based on the clinical situation, it is important to emphasize that patients diagnosed with cardiovascular disease should be educated about secondary prevention measures and the importance of modifying risk factors (5). Stable angina pectoris typically presents with substernal chest pain or pressure that worsens with exertion or emotional stress and improves with rest or nitroglycerin, usually persisting for about two months. Pharmacological interventions include cardioprotective and anti-anginal medications. Percutaneous coronary intervention (PCI) is a minimally invasive procedure performed via radial or femoral artery access under X-ray guidance, classified as a mechanical revascularization technique. Coronary artery bypass graft surgery (CABG) is an important surgical procedure for patients with coronary artery disease (10). Acute coronary syndrome presents as a sudden onset of substernal chest pain or pressure, typically radiating to the neck and left arm. It may be accompanied by dyspnea, palpitations, dizziness, syncope, cardiac arrest, or new-onset congestive heart failure. In STEMI, the primary treatment is per-

cutaneous coronary intervention (PCI). Only if PCI is not available within two hours, thrombolytic therapy is indicated (11). According to the 2020 European Society of Cardiology guidelines, in high-risk NSTEMI patients, an early invasive strategy is recommended within 24 hours of hospital admission. However, in patients with very high risk (e.g., hemodynamic instability, cardiogenic shock, refractory or recurrent symptoms despite medication therapy, malignant arrhythmias, mechanical complications of acute myocardial infarction, acute heart failure, or significant ECG changes), an urgent invasive strategy is advised within two hours of admission. According to guidelines, NSTEMI patients are managed similarly to STEMI patients. Before performing invasive therapeutic procedures, it is necessary to assess indications and contraindications. In valvular heart disease, stenotic lesions and regurgitation can be distinguished, with diagnosis and disease severity determined through cardiac catheterization. Severe forms of valvular disease require surgical intervention, and depending on the affected valve, aortic or mitral valve surgery may be performed (replacement or reconstruction) (13, 14). All therapeutic approaches are characterized by specific side effects and complications that significantly impact the quality of life of patients. The negative effects of treating coronary artery disease can be mitigated by the timely recognition of early signs and symptoms, as well as patient education. The aim of cardiac surgical intervention is to improve patients' quality of life, with the level of improvement depending on the patient's preoperative condition and overall treatment outcomes (15 – 18).

Quality of life of cardiac patients

Quality of life as a concept encompasses an individual's well-being in relation to both positive and negative factors within the system of values and cultural context in which they live. It is assessed at a specific moment and can be described as the individual's level of satisfaction with the opportunities available in their own life. Common factors of quality of life include personal health (physical, mental, and spiritual), relationships, educational status, work environment, social status, economic well-being, sense of security, freedom, autonomy in decision-making, social belonging, and physical environment (18). The aim of cardiac surgery for patients with heart disease is to improve their quality of life in all the mentioned aspects. However, the level of post-surgical improvement is not the same in each patient (4, 19). Improvement in quality of life can be achieved by reducing difficulties and symptoms associated with heart disease (20, 21). Assessing patients' quality of life after heart surgery provides valuable information on the benefits and impact of cardiac surgical procedures in enhancing patients' functionality, quality of life, and level of independence.

A review of the available foreign literature identified numerous studies on this topic. However, only a small number of similar studies have been carried out in Croatia so far, which is why we decided to contribute to increasing that number.

Aim

The objective of this study was to examine the quality of life of patients following cardiac surgery and to analyze differences based on gender, age, diagnosis, and associated comorbidities.

Methods

Participants

A cross-sectional study was conducted at the Clinical Hospital Center Osijek, Clinic for Surgery, Department of Cardiac and Thoracic Surgery. The study included a total of 41 respondents who had undergone cardiac surgery, had been discharged to home care and had come for follow-up examination during March, April, or May of 2024.

The time elapsed since the cardiac surgery was more than six months.

The inclusion criteria were: cardiac surgery at least six months prior; signed informed consent from; legal age of majority: understanding and spoken knowledge of Croatian language.

Data protection

Personal data were collected and processed in compliance with General Data Protection Regulation (EU Regulation 2016/679). Adequate physical, technical and security protection measures were also applied. The respondents had the right to request a revision, supplementation, or removal of private information, as well as the right to restrict processing and withdraw consent at any time.

Ethics

The study was conducted in accordance with all applicable guidelines aimed at ensuring proper implementation and the safety of respondents, including the principles of Good Clinical Practice, the Declaration of Helsinki, the Croatian Health Care Act, and the Croatian Patient Rights Protection Act. Ethical approvals for the study were obtained from the Ethics Committee of the Clinical Hospital Center Osijek and the Ethics Committee of the Faculty of Dental Medicine and Health Osijek.

Instrument and study description

Prior to voluntarily signing the informed consent form, the respondents received a detailed explanation of the study. The respondents completed the questionnaire independently. They were also informed that questionnaire materials containing data from medical records would be used in the study. Furthermore, they received information on the general and specific benefits of the study, its duration and type of procedure, the confidentiality of the obtained data, and privacy protection. Additionally, the respondents were informed about their voluntary participation and their right to withdraw from the study at any time, with a note that refusal to participate would not affect the medical care provided.

A two-part questionnaire was used as the instrument to assess the quality of life of patients following cardiac surgery. The first part of the questionnaire consisted of the questions related to socio-demographic characteristics of respondents (age, gender, place of residence, education, marital status) and risk factors related to heart diseases (hypertension, diabetes, cholesterolemia, smoking). The second part of the questionnaire was a license-free SF-36 Health Questionnaire (22), validated Croatian version (23, 24). The questionnaire consisted of 36 items which assess patients' quality of life in the areas of physical functioning, limitations due to physical and emotional difficulties, vitality and energy, social functioning, bodily pain, general health, role emotional, and mental health. The subscales of vitality and energy, social and emotional functioning, and mental health provide an assessment of mental status, while the remaining subscales evaluate the physical health of the respondents. The total score of the SF-36 questionnaire is presented across eight subscales, with a minimum score of 0 and a maximum of 100. In all subscales, a higher score indicates better subjective health.

Statistics

Categorical data were presented as absolute and relative frequencies. Numerical data were described using the arithmetic mean and standard deviation, as well as the median and interquartile range. The normality of the distribution of numerical variables was tested using the Kolmogorov-Smirnov test. Due to deviations from normal distribution, numerical variables between two independent groups were tested using the Mann-Whitney U test. In cases involving three or more independent groups, numerical variables were tested using the Kruskal-Wallis test due to deviations from normal distribution. All *p*-values are two-sided. The significance level was set at α = 0,05. Computer software used for statistical analysis was SPSS (version 22.0, SPSS Inc., Chicago, IL, USA).

Results

The sample included 41 respondents. Most respondents, 28 (68%) of them, had elevated cholesterol levels (Table 1).

After undergoing cardiac surgery, the respondents were least limited by emotional difficulties, making their quality of life in this subscale the highest, while their quality of life was the lowest in the subscale of physical limitations (Table 2).

There was no significant difference in quality of life in respondents following cardiac surgery in relation to gender. It was evident that women were less limited due to physical difficulties than men (Table 3).

Respondents in the 65 – 79 age group had significantly lower physical functioning in relation to the

Table 1. **General information**

		N (%)
Gender	Male	27 (66)
	Female	14 (34)
Age	45 – 54	9 (22)
	55 – 64	11 (27)
	65 – 79	21 (51)
Place of residence	Urban	19 (46)
	Rural	22 (54)
Education	Primary	8 (20)
	Secondary	22 (54)
	Higher	11 (26)
Marital status	Married	26 (63)
	Divorced	3 (7)
	Single	2 (5)
	Cohabiting	4 (10)
	Widowed	6 (15)
Comorbidities	Diabetes	11 (27)
	Hypertension	18 (44)
	Obesity	1 (2)
	Other	11 (27)
Do you have elevated cholesterol level?	Yes	28 (68)
	No	13 (32)
Do you smoke?	Yes, up to 10 cigarettes a day	11 (27)
	Yes, more than 10 cigarettes a day	12 (29)
	I do not smoke	18 (44)
Medical diagnosis for your surgery	Combined surgery	9 (22)
	Aortic valve surgery	9 (22)
	Mitral valve surgery	7 (17)
	Coronary artery bypass surgery	16 (39)
How much time has passed since the surgery?	6 months to a year	26 (53)
	1 – 2 years	13 (32)
	More than 2 years	2 (5)
Total		41 (100)

Table 2. **Quality of life of respondents according to SF-36 subscales**

Subscale	Arithmetic mean	SD	Median	Interquartile range	Min - max
PF	64.87	25.11	65	47.5 - 85	0 - 95
RP	56.09	37.40	50	25 - 100	0 - 100
RE	73.98	36.90	100	33 - 100	0 - 100
VT	59.14	18.19	60	50 - 70	10 - 85
SF	61.89	23.54	62.5	50 - 75	0 - 100
BP	72.98	18.83	77.5	65 - 90	22.5 - 100
GH	54.09	16.34	52	47.5 - 65	10 - 85
MH	65.95	18.50	68	54 - 82	8 - 92

*PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP – bodily pain, GH – general health, MH – mental health

Table 3. **Quality of life of respondents according to SF-36 subscales in relation to gender**

Subscale	Median (interquartile range)		*p**
	Male	Female	
PF	65 (55 - 85)	67.5 (41.25 - 86.25)	0.92
RP	50 (25 - 75)	100 (25 - 100)	0.09
RE	100 (33 - 100)	100 (58 - 100)	0.42
VT	65 (55 - 75)	60 (43.75 - 70)	0.44
SF	62.5 (50 - 75)	50 (37.5 - 81.25)	0.56
BP	77.5 (67.5 - 77.5)	67.5 (55 - 93.5)	0.97
GH	55 (50 - 65)	51 (38.75 - 62.75)	0.45
MH	68 (60 - 84)	60 (52 - 77)	0.42

*Mann – Whitney U test; PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP – bodily pain, GH – general health, MH – mental health

Table 4. **Quality of life of respondents according to SF-36 subscales in relation to age**

Subscale	Median (interquartile range)			χ2-test	*p**
	45 - 54 (N = 9)	55 - 64 (N = 11)	65 - 79 (N = 21)		
PF	85 (32.5 - 92.5)	85 (80 - 90)	55 (45 - 65)	12.344	0.002[a]
RP	75 (25 - 100)	75 (25 - 100)	50 (25 - 87.5)	1.187	0.55
RE	100 (16.7 - 100)	100 (100 - 100)	100 (33.3 - 100)	2.496	0.29
VT	70 (45 - 77.5)	70 (60 - 80)	60 (50 - 62.5)	6.230	0.04[a]
SF	75 (56.25 - 93.75)	62.5 (50 - 100)	50 (37.5 - 68.75)	4.453	0.11
BP	77.5 (50 - 88.75)	90 (77.5 - 100)	67.5 (55 - 77.5)	7.505	0.02[a]
GH	52 (50 - 70)	55 (50 - 70)	52 (37.5 - 61)	6.665	0.47
MH	72 (60 - 86)	76 (56 - 84)	60 (52 - 76)	2.731	0.25

*Kruskal-Wallis test; [a]at $p<0.05$ significant difference between the 65 – 79 age group and the 55 – 64 age group; PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP – bodily pain, GH – general health, MH – mental health

55 – 64 age group (Kruskal-Wallis, post hoc p=0.002). They also had significantly lower vitality and energy (post hoc p=0.04). Respondents in the 65 – 79 age group experienced pain significantly more (post hoc p=0.02) in relation to the 55 – 64 age group (Table 4).

Respondents who had undergone combined surgery had significantly lower physical functioning (post hoc p=0.02), social functioning (post hoc p=0.02). Also, they experienced pain significantly higher (post hoc p=0.04) in relation to respondents who had had mitral valve surgery (Table 5).

There was no significant difference in the quality of life of respondents with hypertension and diabetes (Table 6).

Discussion

This study examined the quality of life of patients following cardiac surgery. Among the 41 respondents, 66 % were males, 63 % were married, and 54 % lived in rural areas, with the same percentage having completed secondary education. The demographic structure of the respondents in this study aligns with previous studies (20, 25), which also involved a higher proportion of male respondents (21, 26), who were married and had completed secondary education (21). The average age of the respondents was 61.1 years (25). The

Table 5. **Quality of life of respondents according to SF-36 subscales in relation to diagnosed disease**

Subscale	Median (interquartile range)				χ2-test	p*
	Combined surgery (N = 9)	Aortic valve surgery (N = 9)	Mitral valve surgery (N = 7)	Coronary artery bypass surgery (N = 16)		
PF	60 (37.5 - 72.5)	55 (35 - 98.5)	90 (80 - 95)	65 (47.5 - 85)	10.092	0.02 [a]
RP	50 (12,5 - 87,5)	50 (12,5 - 100)	100 (50 - 100)	50 (25 - 75)	4,933	0,18
RE	100 (33.3 - 100)	100 (50 - 100)	100 (100 - 100)	100 (33.3 - 100)	2.008	0.57
VT	55 (50 - 62.5)	60 (35 - 72.5)	75 (70 - 80)	62.5 (51.25 - 70)	6.588	0.09
SF	50 (37.5 - 50)	50 (43.75 - 75)	75 (62.5 - 100)	62.5 (50 - 84.73)	9.415	0.02 [a]
BP	67.5 (45 - 83.75)	67.5 (55 - 77.5)	90 (77.5 - 100)	77.5 (67.5 - 85)	8.154	0.04 [a]
GH	50 (30 - 54.5)	52 (50 - 62.5)	65 (50 - 80)	55 (42.5 - 64.25)	7.259	0.13
MH	60 (50 - 68)	68 (60 - 76)	84 (72 - 88)	60 (53 - 83)	6.775	0.08

*Kruskal-Wallis test; [a]at p<0.05 significant difference between combined surgery and mitral valve surgery; PF - physical functioning, RP - role physical, RE – role emotional, VT - vitality, SF - social functioning, BP - bodily pain, GH - general health, MH - mental health

Table 6. **Quality of life of respondents according to SF-36 subscales in relation to comorbidities**

Subscale	Median (interquartile range)		χ2-test	p*
	Diabetes (N = 11)	Hypertension (N = 18)		
PF	65 (45 - 85)	65 (51.25 - 81.25)	0.018	0.89
RP	50 (0 - 100)	50 (25 - 75)	0.118	0.73
RE	100 (33.3 - 100)	100 (33.3 - 100)	1.798	0.18
VT	60 (50 - 70)	60 (43.75 - 66.25)	0.592	0.44
SF	50 (37.5 - 75)	50 (37.5 - 65.62)	0.193	0.66
BP	67.5 (45 - 77.5)	72.5 (66.87 - 80.62)	2.344	0.13
GH	50 (30 - 52)	52 (39.25 - 60.5)	0.341	0.56
MH	60 (52 - 72)	60 (50 - 77)	0.100	0.75

*Kruskal-Wallis test; PF – physical functioning, RP – role physical, RE – role emotional, VT – vitality, SF – social functioning, BP –bodily pain, GH – general health, MH – mental health

results of this study indicated that 68% of respondents had elevated cholesterol levels, 44% were non-smokers, and 29% smoked more than 10 cigarettes per day. Given the average age of 61.9 years in the study, the high prevalence of hypertension can be considered expected. A study by Ostchega et al. also highlighted a high prevalence of hypertension in individuals over 60 years old (26), and studies conducted in Ghana (27) and Germany (28) similarly indicated an association between increasing age and the prevalence of hypertension. The State of Health in the EU: Croatia 2023 report showed that smoking is the second most significant risk factor contributing to increased mortality rates and that tobacco use in Croatia is among the highest in Europe. According to that report, approximately 22% of Croatian citizens reported being smokers, which is 3% higher than the European average (29). In this study, most respondents underwent coronary artery bypass surgery, and the most common time interval between the surgery and participation in the study was between six months and one year. Differences in quality of life after this period indicated that respondents experienced the least limitations due to emotional difficulties, making this subscale the highest-rated in terms of quality of life. Conversely, the lowest quality of life was reported in the subscale of physical limitations. A study by Peric et al. from 2017 suggested that respondents experienced an overall improvement in quality of life across all assessed areas following cardiac surgery. However, a slightly lower quality of life was observed in the subscale of physical limitations during the first six months following surgery (2). A study by Perotti et al. from 2019 showed that ten years after undergoing cardiac surgery, the respondents reported the highest quality of life in the subscale of psychological and physical functioning (21). The differences in levels of the quality of life across the examined subscales may depend on the patient's condition before surgery, their expectations, and the presence of risk factors. When analyzing differences in quality of life based on demographic variables, no significant differences were found between genders; however, women experienced fewer physical limitations than men. In a study conducted in Serbia, men assessed their quality of life higher than women, but both genders showed significant improvement after cardiac surgery (2). Respondents aged 65 and older reported significantly poorer physical functioning, lower vitality and energy levels, and higher levels of pain compared to younger respondents. A study conducted in New York also indicated that older age is a predictor of poorer quality of life after cardiac surgery, as participants over 75 years old reported significantly worse quality of life compared to those aged 74 and younger (30). The lower quality of life among older respondents can be explained by the fact that ageing negatively affects health according to self-assessments, particularly in the subscales of mental and physical health (31). The respondents who had undergone mitral valve surgery reported significantly better physical and social functioning, as well as significantly lower pain levels compared to those who had had a combined surgery. However, the comparison by diagnosis was based on a very small sample size, and despite the significant differences found, these results should be interpreted with caution, requiring further validation. A study by Kulik A. from 2017 indicated that one month after percutaneous coronary intervention, the respondents achieved significantly better quality of life in terms of physical limitations, pain, and overall health compared to those who underwent coronary artery bypass graft surgery (32). The same study showed that six months post-procedure, these differences leveled out, with coronary artery bypass graft patients experiencing fewer physical limitations compared to those who had undergone percutaneous coronary intervention (32). Findings from a study by Cohen et al., conducted on 1800 patients after cardiac surgery, suggested that the quality of life was better in the first six months following percutaneous coronary intervention. However, after six months, the quality-of-life outcomes became similar, and after one year, they were better in patients who underwent coronary artery bypass grafting (33). A study conducted in the Netherlands showed the same results (34). Studies by other authors indicated that patients a year after undergoing coronary artery bypass graft surgery demonstrated better quality of life outcomes compared to those who underwent percutaneous coronary intervention (35, 36). Diabetes and hypertension were among the most common comorbidities in respondents, and no significant differences were found in the quality of life between those with hypertension and diabetes. However, studies conducted in Serbia (2) and France (21) suggested that respondents with diabetes had a lower quality of life following cardiac surgery. In contrast, a study in Colorado found that hypertension and smoking were the most strongly associated with lower quality of life following cardiac surgery (37). A study by Pačarić et al. indicated poor quality of life among patients following cardiac surgery, regardless of risk factors (20). This study, like other studies in the literature (2, 21, 37),

provides valuable insights into the impact of disease risk factors on quality of life following cardiac surgery, highlighting the importance of primary prevention at an early age. Adhering to healthy lifestyle recommendations in youth can significantly influence the development of heart disease, while reducing risk factors in patients with an existing diagnosis can contribute to achieving positive treatment outcomes and improving the quality of life. The quality of life is becoming an increasingly important research topic in medicine, as it reflects both the objective clinical or physiological status and the patient's subjective perception of how their health condition or diagnostic and therapeutic procedures affect their life and well-being. Assessing the quality of life of patients after undergoing cardiac surgery is essential for a comprehensive understanding of their physical, emotional, and social needs. Although cardiac surgeries often save lives, they can have a significant impact on patients' physical functionality, psychological well-being, and social interactions. The quality of life following cardiac surgery varies across different parts of the world. An interesting difference in the domain of pain was observed in a study conducted in Iran (38), where pain was rated the lowest compared to this and other studies (2, 20, 21). This was attributed to non-adherence to prescribed medications and medical advice. Such findings highlight the need for different intervention strategies in different countries to improve the quality of life of patients. Through systematic monitoring and assessment of the quality of life, healthcare professionals can identify specific challenges patients face in the postoperative period and develop personalized interventions to enhance their overall well-being. This approach not only leads to better medical outcomes but also contributes to the improvement of rehabilitation programs, the reduction of psychological distress, and the facilitation of patients' reintegration into everyday life. In conclusion, it can be stated that assessing quality of life following cardiac surgery is not only of medical importance but also of social and emotional significance, as it directly contributes to the overall health and well-being of patients.

The limitations of this study include the fact that it was conducted in a single institution, with a small and convenience-based sample. Additionally, some important variables were assessed in a less sensitive manner, such as the time elapsed since surgery. Since the study was conducted in a single geographic area, the results cannot be generalized. However, they can serve as a basis for designing interventions aimed at improving the quality of life of patients.

Conclusion

The results of this study indicated that, after undergoing cardiac surgery, patients experience the least limitations due to emotional difficulties, making their quality of life in this subscale the highest, while their quality of life is the lowest in the subscale of physical limitations. There was no significant difference in the quality of life of patients following cardiac surgery based on gender. Patients aged 65 and older had significantly lower quality of life in the subscales of physical functioning, vitality and energy, and pain compared to younger patients. Patients who underwent mitral valve surgery had significantly better quality of life in the subscales of physical and social functioning, as well as pain, compared to those who underwent combined surgery. There was no significant difference in the quality of life between patients with hypertension and diabetes.

Author contributions

Conceptualization (AB, NF); Data curation (AB, BB, MC); Formal analysis (IB, KK); Funding acquisition (AB, ZG, NF); Investigation (AB, MC); Methodology (IB, KK, NF); Project administration (BB, KK); Resources (AB, ZG, MC); Software (IB, KK, MC); Supervision (IB, ZG, NF); Validation (IB, ZG, NF); Visualization (BB, IB); Writing – original draft (AB, BB, NF); Writing – review & editing (AB, BB, KK, IB, ZG, MC, NF).

Conflict of interest

The authors declare no conflict of interest.

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