



# Investigating Occupation, Ejection Fraction, and Comorbidity Factors with Quality of Life in Heart Failure Patients: A Cross-sectional Study in Indonesia

Cut Husna <sup>1,\*</sup>, Halfiah Halfiah <sup>2</sup> and Marlina Marlina <sup>3</sup>

<sup>1</sup>Department of Medical and Surgical Nursing, Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, 23111, Indonesia

<sup>2</sup>Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, 23111, Indonesia

<sup>3</sup>Department of Emergency Nursing, Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, 23111, Indonesia

\*Corresponding author: Department of Medical and Surgical Nursing, Faculty of Nursing, Universitas Syiah Kuala, Banda Aceh, 23111, Indonesia. Email: cuthusna@usk.ac.id

Received 2022 October 08; Revised 2022 December 12; Accepted 2022 December 26.

## Abstract

**Background:** Heart disease causes functional disorders that can cause the sufferer to experience fatigue and dyspnea, leading to low quality of life. Various factors related to the quality of life of heart failure patients include occupation and ejection fraction. The number of heart failure patients treated at Aceh government hospital is still high in 2021, as well as the incidence of recurrent hospitalization.

**Objectives:** This study aimed to determine the relationship between occupation, ejection fraction, and heart failure patients' quality of life.

**Methods:** The study used a quantitative research approach with a cross-sectional design. The sample was 154 heart failure patients who visited the Cardiac Polyclinic of a provincial hospital in Banda Aceh, Indonesia. Data on patient occupation, ejection fraction, and comorbidity factors were obtained from the sociodemographic and clinical characteristics of the respondents. Then, the patient's quality of life was measured by the Minnesota Living with Heart Failure (MLHF) questionnaire. The chi-square test and logistic regression (with a significance level  $\alpha = 0.05$ ) were used in data analysis in this study.

**Results:** The results of the study found a significant direct correlation between patient occupation ( $P = 0.001$ ), ejection fraction ( $P = 0.001$ ), and an inverse correlation of comorbidity factors ( $P = 0.001$ ) with quality of life ( $\alpha = 0.05$ ). The multivariate analysis using logistic regression found that the dominant factor, ejection fraction, was associated with the quality of life of heart failure patients with OR: 12.033, followed by comorbidity factors (OR: 3.565) and occupation (OR: 1.819).

**Conclusions:** The quality of life of heart failure patients is strongly associated with the ejection fraction in heart failure patients; therefore, maintaining the ejection fraction is needed to improve the quality of life.

**Keywords:** Heart Failure, Occupation, Ejection Fraction, Comorbidity, Quality of Life

## 1. Background

Cardiovascular disease is associated with a high fatality rate. In 2019 an estimated 17.9 million people died from cardiovascular disease, representing 32% of all deaths worldwide. Globally, cardiovascular disease is one of the most important causes of death compared to cancer and other non-communicable diseases. As many as 85% of the deaths are caused by heart disease and stroke (1).

One of the heart diseases that we often find is heart failure. Heart failure is a clinical symptom due to structural and functional disruption of the heart, resulting in a decreased ability of the ventricles to pump blood throughout the body. The decrease in ventricular ability will

cause heart failure's main symptoms, including peripheral edema, pulmonary congestion, dyspnea, and fatigue, causing patients to experience weakness and decreased ability to perform activities (2). Dyspnea and fatigue experienced by patients with heart failure can deteriorate the quality of life of patients (3).

The quality of life of a patient with heart failure can be influenced by the characteristics of the patient, occupation being among them (4). In addition, the ejection fraction also affects the quality of life of heart failure patients (5). Furthermore, comorbidity factors also affect the prognosis of heart failure, comorbid factors with number one or more patients will make a worse prognosis than patients with no comorbid factors (6). A similar study re-

ported that strong relationship between age and comorbidities and the quality of life of patients with heart failure (7).

Comorbid factors have a major influence on our patient's heart failure course comorbidities only affect the patient's clinical condition and have a major impact on managing heart failure. They can affect the patient's quality of life. These comorbid factors include diabetes, hypertension, and kidney dysfunction (8).

## 2. Objectives

The purpose of this study was to identify the relationship between sociodemographic factors and clinical characteristics with quality of life in heart failure patients and to determine the main factors associated with these patients' quality of life, determine the relationship between occupation, ejection fraction, and heart failure on the patients' quality of life in Banda Aceh hospital, Indonesia.

## 3. Methods

### 3.1. Design

The study was quantitative research with a cross-sectional design. The study aimed to examine predicting factors (occupation, ejection fraction, and comorbidity factors) associated with heart failure patients' quality of life.

### 3.2. Participants

This study was conducted in 2022 at a provincial hospital in Banda Aceh, Indonesia, with a total sample of 154 heart failure patients. The sample criteria include: (1) diagnosed heart failure  $\geq$  1 month (the patient was diagnosed with heart failure based on medical records from an outpatient visit to the heart polyclinic at the provincial hospital), (2) patients were not in a dyspnea state and were fully conscious, (3) patients with NYHA I, II, and III, (4) willingness to participate in the study.

### 3.3. Data Collections

Data collection was carried out for two weeks, from July 14 to 31, 2022. The instruments used were sociodemographic and clinical characteristic questionnaires to identify patients' occupations, ejection fraction, and comorbidity factors. Moreover, the Minnesota Living with Heart Failure (MLHFQ) questionnaire was used to measure the quality of life of patients with heart failure and answer how much heart failure affected their life during the past month (4 weeks). The MLHFQ comprised 21 items in five point-Likert scales. The Minnesota Living with heart failure questionnaire by Rector (1993) is scored: As fair if the

h score is  $>$  50; good if the score is  $\leq$  50. In this study, we only focused on the factors related to patients' occupation, ejection fraction, and comorbidity factors with the quality of life of heart failure patients. The other factors were not analyzed and needed further study.

Data on the patient's occupation were extracted from the patient's characteristic instruments, with the categories working and not working. Meanwhile, the patient's ejection fraction was measured by the registered and recorded value of left ventricle ejection fraction (LVEF) in the echocardiography examination test. Echocardiography patients were taken  $\leq$  6 months of period measurement. The measurement of the value of the ejection fraction based on the classification of heart failure according to the European Society of Cardiology (ESC) in 2016 comprised 3 groups, namely heart failure with reduced ejection fraction (HFrEF) with LVEF value  $<$  40%, heart failure mid-range, ejection fraction (HFmrEF) with LVEF value 40 - 49%, and heart failure with preserved ejection fraction (HFpEF) with LVEF value  $\geq$  50% (9).

MLHFQ comprises two domains, physical and emotional, which describe two aspects of the quality of life. MLHFQ is a standardized questionnaire tested for reliability with Cronbach's alpha coefficient between 0.87 and 0.95 (10).

### 3.4. Statistical Analysis

The statistical analysis in the study was conducted using the chi-square test to identify any significant relationship between patient occupation, ejection fraction, and comorbidity factors with quality of life in heart failure patients. The multivariate regression analysis was used to predict dominant factors (ejection fraction, comorbidity factors, and occupation) with quality of life.

## 4. Results

The socio-demographic data showed that 61.7% of respondents were  $>$  55 years old, most of the respondents (66.9%) were female, most of them (63.6%) had occupations, and 83.1% were married (Table 1).

The results demonstrated a significant direct correlation between patient occupation ( $P = 0.001$ ), ejection fraction ( $P = 0.001$ ), and an inverse correlation of comorbidity factors ( $P = 0.001$ ) with quality of life in heart failure patients. The logistic regression showed that the dominant characteristics associated with the quality of life in heart failure patients were ejection fraction (OR: 12.033), followed by comorbidity factors (OR: 3.565), and occupation (OR: 1.819).

The descriptive analysis in Table 2 showed that in 154 heart failure patients, 70 respondents (45.5%) had the LVEF

**Table 1.** Sociodemographic of the Respondents (n = 154)

Characteristics of Respondents	No. (%)
<b>Age (y)</b>	
≤ 55	59 (38.3)
> 55	95 (61.7)
<b>Gender</b>	
Male	103 (66.9)
Female	51 (33.1)
<b>Occupation</b>	
Working	98 (63.6)
Not working	56 (36.4)
<b>Marital status</b>	
Married	128 (83.1)
Single	1 (0.6)
Divorce	25 (16.2)

**Table 2.** Ejection Fraction and Quality of Life of Heart Failure Patients (n = 154)

Variables	No. (%)
<b>Ejection fraction</b>	
Preserved LVEF	37 (24.0)
Mid-Range LVEF	70 (45.5)
Reduced LVEF	47 (30.5)
<b>Quality of life</b>	
Good	103 (66.9)
Fair	51 (33.1)

in mid-range ejection fraction, and 103 (66.9%) had a good quality of life.

The chi-square statistical test was conducted to analyze the data. Table 3 showed that 80 (81.6%) heart failure patients had a good quality of life with occupation, and 58.9% had an acceptable quality of life with no occupation (not working).

The statistical test using chi-square in Table 4 showed that there was a direct correlation between ejection fractions (mid-Range LVEF) and quality of life of heart failure patients ( $P = 0.001, < 0.05$ ).

The multivariate analysis using logistic regression to identify dominant factors (ejection fraction, comorbidity factors, and occupation) with quality of life as a binomial variable. Table 5 shows that of 56 heart failure patients who did not have comorbidities and 49 (87.5%) had a good quality of life, and of 63 patients with one comorbidity, 48 (76.2%) had a good quality of life. From 35 patients with comorbidity  $\geq 2$  found, 29 (82.9%) experienced a fair quality of life.

Table 6 shows that the ejection fraction was the most dominant factor associated with the quality of life of heart failure patients with an Odds Ratio (OR: 12.033).

## 5. Discussion

Occupation refers to the importance of an activity, the time and energy spent, and the rewards obtained. The study's results in Table 4 shows that of 27 patients with heart failure who did not work, most or 15 people (55.6%) had an acceptable quality of life. It is concluded that there is a significant relationship between work and the quality of life of heart failure patients at the hospital (11).

The results are in line with a study stating that heart failure patients' quality of life is generally influenced by occupational status and the habit of doing sports (12). Working and income have a significant and positive influence on the quality of life of heart failure patients; work brings income to meet the needs of life and their family (5). Finances are factors that affect health and negatively impact and contribute to a person's health condition; patients who have a low income have a low quality of life because heart failure patients depend on medical care and patients cannot bear medical expenses and living costs as the patient's physical condition is impaired. It will affect the health of the individual (13).

Individual health is also influenced by socioeconomic status; low socioeconomic status is reported as a predictor of increased heart failure and will impact higher levels of stress or depression and affects the health condition of heart failure patients (14).

Other studies reported that work has a significant effect on the quality of life of heart failure patients. Patients who work reportedly have a better quality of life than patients who do not work (15, 16). The reason is that patients who work will always carry out daily physical activities, by doing work, is predicted that they can reduce pressure, anxiety, and stress and improve physical, social, and financial conditions besides reducing the economic burden. Working also allows patients to communicate with more people and reduce emotional burdens (15).

The results are also in line with a previous study that stated income is a factor that could affect the quality of life of heart failure patients. Financial difficulties, job loss, increased cost of living, and treatment negatively impact their quality of life (17). In this study, heart failure patients under treatment at this hospital were included who generally use health insurance that the Aceh Government, Indonesia, has programmed. Therefore, it helped patients who needed routine care and treatment, including heart failure patients. The working environment of the patients can make the patient often interact with numerous people

**Table 3.** The Relationship Between Occupation with the Quality of Life of Heart Failure Patients (n = 154)

Occupation	Quality of Life		Total	$\chi^2$	P-Value
	Good	Fair			
Working	80 (81.6)	18 (18.4)	98 (100)	0.05	0.001 <sup>b</sup>
Not working	23 (41.1)	33 (58.9)	56 (100)		
Total	103 (66.9)	51 (33.1)	154 (100)		

<sup>a</sup> Values are expressed as No. (%).<sup>b</sup> Chi-square**Table 4.** Relationship Between Ejection Fraction and the Quality of Life of Patients with Heart Failure (n = 154)<sup>a</sup>

Ejection Fraction	Quality of Life		Total	$\chi^2$	P-Value
	Good	Fair			
Preserved LVEF	36 (97.3)	1 (2.7)	37 (100)	0.05	0.001 <sup>b</sup>
Mid-Range LVEF	54 (77.1)	16 (22.9)	70 (100)		
Reduced LVEF	13 (27.7)	34 (72.3)	47 (100)		
Total	103 (66.9)	51 (33.1)	154 (100)		

<sup>a</sup> Values are expressed as No. (%).<sup>b</sup> Chi-square**Table 5.** The Relationship Comorbidity Factors with Quality of Life in Heart Failure Patients (n = 154)<sup>a</sup>

Comorbid Factors	Quality of Life		Total	$\chi^2$	P-Value
	Good	Fair			
No comorbidity	49 (87.5)	7 (12.5)	56 (100)	0.05	0.001 <sup>b</sup>
Having one comorbidity	48 (76.2)	15 (23.8)	63 (100)		
Having $\geq 2$ comorbidity	6 (17.1)	29 (82.9)	35 (100)		
Total	103 (66.9)	51 (33.1)	154 (100)		

<sup>a</sup> Values are expressed as No. (%).<sup>b</sup> Chi-square**Table 6.** The Effect of Occupation, Comorbidity, and Ejection Fraction Factors on Quality of Life in Heart Failure Patients (n = 154)

Variables	Predictor	OR	95 CI		P-Value
			Lower	Upper	
Quality of life	Occupation	1.819	0.839	3.944	0.130
	Comorbidity	3.565	1.437	8.840	0.006
	Ejection fraction	12.033	2.500	57.920	0.002

and increase income and help the patients' financial condition, thereby reducing the pressure or depression felt due to the disease suffered. Based on the discussion, it could be concluded that the patients' occupation affected the quality of life of heart failure patients.

Furthermore, ejection fraction is a measurement to determine how well the heart can pump blood throughout

the body. Measurement of the ejection fraction is carried out to establish a diagnosis of heart failure carried out using echocardiography. The echocardiography results assess the patient's heart failure (16).

The European Society of Cardiology (ESC) in 2016 stated that the ejection fraction comprised 3 groups, namely heart failure with reduced ejection fraction (HFrEF) or

duced LVEF: < 40%), heart failure mid-range ejection fraction (HFmrEF) or mid-range ejection fraction (HFmrEF). LVEF range: 40 - 49% and heart failure with preserved ejection fraction (HFpEF) or held LVEF 50% (9).

Ejection fraction can affect patients' quality of life; HFpEF sufferers generally have a better quality of life than people with HfrEF (18). The findings of this study demonstrated that the ejection fraction could affect the patient's quality of life (QoL), and QoL is impaired due to changes in LVEF experienced by the patient. Patients with reduced LVEF may experience a decreased quality of life, and patients with symptomatic preserved LVEF may also experience a poor quality of life (19).

This study's results align with previous research demonstrating that an LVEF < 40% will reduce the quality of life compared to heart failure patients with an LVEF of 40 - 60%. The lower the LVEF value of heart failure patients can decrease of patients' quality of life (20). The results are also following previous studies that reported that ejection fraction can affect the quality of life of patients, and patients with ejection fraction (EF) < 40% have a low quality of life, while patients with EF  $\geq$  40% have a better quality of life. These results are in line with the findings in this study which showed that patients with low LVEF would experience a decrease in quality of life, especially patients with LVEF < 40% (reduced LVEF) (21).

This study showed that the most severe decrease in the quality of life was observed in patients with reduced LVEF, while patients with preserved LVEF quality of life were at a good level. The ejection fraction of patients in the reduced LVEF group generally has more severe symptoms than those with preserved LVEF and mid-range LVEF. This occurs because the heart's ability to pump blood throughout the body decreases, and symptoms such as shortness of breath, fatigue, sleep disturbances, severe physical weakness, and edema in the extremity area, and even the worst impact is the occurrence of pulmonary edema may happen. Their ejection fraction could influence the patient's quality of life. To improve a patient's quality of life, it is necessary to carry out care and treatment so that the patient's ejection fraction could be improved and the patient could adapt to their ejection fraction.

The next is comorbidity factors suffered by the patient that will affect the course of the patient's heart failure. The comorbidity factors not only affect the patient's clinical condition but also have a major impact on the management of heart failure and can affect the patient's quality of life (8). This study also found comorbidity factors in heart failure patients, and the most common comorbidity factors found were diabetes mellitus and hypertension. Patients with comorbidity factors have a decreased quality of life compared to patients who do not have comorbid

factors, especially those with more than one comorbidity. The findings of this study indicate that the quality of life is lower in patients with two comorbid factors. This is because comorbid factors can cause physical weakness and helplessness in patients due to heart failure and other diseases or comorbid factors.

One study that investigated 661 heart failure patients who were observed for three years found that patients who died during follow-up who had been diagnosed with long-standing heart failure were hospitalized more often due to heart failure, and also often patients diagnosed with diabetes or having a history of stroke in the past (19). Another supporting study mentioned that there is a significant relationship between comorbidities and the quality of life of heart failure patients; comorbidities are assessed as predictors that affect the quality of life (22).

The results are also in line with previous studies, which stated that heart failure patients who do not have comorbidity have a better quality of life than those with comorbid diseases (6). The patient's comorbidities and the physical weakness felt by patients are independent predictors of the health status of outpatient heart failure (23). Also supported by the study, comorbid factors can affect the quality of life of heart failure patients (5). A previous study also stated that hypertension is comorbid that decreases the quality of life in heart failure patients (24).

Comorbidity factors of heart failure patients could affect the patient's health condition and cause a worsening of the heart failure suffers. It will aggravate the symptoms of heart failure, such as shortness of breath, fatigue, weakness, and repeated hospitalization. Patients could also experience anxiety and depression. The quality of life of patients with heart failure could be improved by regular control of the comorbid factors.

### 5.1. Research Limitations

This study only investigated three factors related to the quality of life of heart failure patients, and other factors should be examined in future studies.

### 5.2. Conclusions

This study found a significant association between occupation, ejection fractions, and comorbidity factors and the quality of life of heart failure patients. The ejection fraction was a major predicting variable that most severely affected heart failure patients' quality of life. The quality of life of heart failure patients may be improved by monitoring the patient's ejection fraction through proper management of care and treatment. Including several factors related to the quality of life in heart failure subjects was a



novelty in the study. The principal one was ejection fraction with OR: 12.033, followed by comorbidity factors (OR: 3.565) and occupation (OR: 1.819).

## Acknowledgments

The authors are grateful to all patients with heart failure in the hospital who willingly participated in this study. The authors also thank the head nurse, nurses in this hospital, and research assistants who helped collect data and made substantial contributions to data analysis in this study.

## Footnotes

**Authors' Contribution:** H. H drafted and conceptualized the manuscript, C. H dan M.M. made revisions and criticisms. All authors agreed with the final version of the manuscript for publication.

**Conflict of Interests:** The authors declared no competing interest in the study.

**Data Reproducibility:** The data presented in this study are uploaded during submission as a supplementary file and are openly available for readers upon request.

**Ethical Approval:** The Ethical Committee of Dr. Zainoel Abidin Hospital (Banda Aceh, Indonesia) approved this study with KEPPKN Registration Number: 1171012P and "Ethical exemption" number: 141/EA/FK-RSUDZA/2022.

**Funding/Support:** None.

**Informed Consent:** Written informed consent was obtained from all respondents who participated in the study.

## References

- World Health Organization. *World health statistics 2020: monitoring health for the SDGs, sustainable development goals*. 68. World Health Organization; 2020. p. 1-12.
- Yancy CW, Jessup M, Bozkurt B, Butler J, Casey DJ; Writing Committee Members, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on practice guidelines. *Circulation*. 2013;128(16):e240-327. [PubMed ID: 23741058]. <https://doi.org/10.1161/CIR.0b013e31829e8776>.
- Saida S, Haryati H, Rangki L. [Quality of Life of Patients with Congestive Heart Failure based on the Level of Physical Ability and Duration of Illness]. *Faletehan Health J*. 2020;7(2):70-6. Indonesian. <https://doi.org/10.33746/fhj.v7i02.134>.
- Akhmad AN. [Quality of life of patients with Congestive Heart Failure (CHF) Based on Demographic characteristics]. *J Nursing Soedirman*. 2018;11(1):27-34. Indonesian.
- Rangki L, Haryati H, Saida S. Kualitas Hidup Penderita Gagal Jantung Kongestif Berdasarkan Derajat Kemampuan Fisik dan Durasi Penyakit. *Faletehan Health J*. 2020;7(2):70-6. <https://doi.org/10.33746/fhj.v7i02.134>.
- van den Berge JC, van Vark LC, Postmus D, Utens E, Hillege HL, Boersma E, et al. Determinants of quality of life in acute heart failure patients with and without comorbidities: a prospective, observational study. *Eur J Cardiovasc Nurs*. 2022;21(3):205-12. [PubMed ID: 34392355]. <https://doi.org/10.1093/eurjcn/zvab061>.
- Fotos NV, Giakoumidakis K, Kollia Z, Galanis P, Copanitsanou P, Pananoudaki E, et al. Health-related quality of life of patients with severe heart failure. A cross-sectional multicentre study. *Scand J Caring Sci*. 2013;27(3):686-94. [PubMed ID: 23004008]. <https://doi.org/10.1111/j.1471-6712.2012.01078.x>.
- Braunwald E, Zipes DP, Libby P. *Braunwald: Heart Disease: A Textbook of Cardiovascular Medicine [Internet]*. 6th ed. Philadelphia: W.B. Saunders Company; 2001. 1960 p.
- Ponikowski P, Voors AA, Anker SD, Bueno H, Cleland JGF, Coats AJS, et al. 2016 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure: The Task Force for the diagnosis and treatment of acute and chronic heart failure of the European Society of Cardiology (ESC) Developed with the special contribution of the Heart Failure Association (HFA) of the ESC. *Eur Heart J*. 2016;37(27):2129-200. [PubMed ID: 27206819]. <https://doi.org/10.1093/eurheartj/ehw128>.
- Mogle J, Buck H, Zambroski C, Alvaro R, Vellone E. Cross-Validation of the Minnesota Living With Heart Failure Questionnaire. *J Nurs Scholarsh*. 2017;49(5):513-20. [PubMed ID: 28755434]. <https://doi.org/10.1111/jnu.12318>.
- Wiltshire AH. The meanings of work in a public work scheme in South Africa. *Int J Sociol Soc Policy*. 2016;36(1/2):2-17. <https://doi.org/10.1108/ijssp-02-2015-0014>.
- Yeh HF, Shao JH. Quality of Life and Associated Factors in Older Adults With Heart Failure. *J Nurs Res*. 2021;29(5). e166. [PubMed ID: 34267165]. <https://doi.org/10.1097/JNR.0000000000000445>.
- Ewnetu Tarekegn G, Derseh Gezie L, Yemanu Birhan T, Ewnetu F. Health-Related Quality of Life Among Heart Failure Patients Attending an Outpatient Clinic in the University of Gondar Comprehensive Specialized Hospital Northwest, Ethiopia, 2020: Using Structural Equation Modeling Approach. *Patient Relat Outcome Meas*. 2021;12:279-90. [PubMed ID: 34483692]. [PubMed Central ID: PMC8409769]. <https://doi.org/10.2147/PROM.S322421>.
- Su A, Al'Aref SJ, Beecy AN, Min JK, Karas MG. Clinical and Socioeconomic Predictors of Heart Failure Readmissions: A Review of Contemporary Literature. *Mayo Clin Proc*. 2019;94(7):1304-20. [PubMed ID: 31272573]. <https://doi.org/10.1016/j.mayocp.2019.01.017>.
- Sawafra FJ, Chen X. Quality of life of Chinese heart failure patients and their family caregivers. *Int J Appl Sci Technol*. 2013;3(2):77-88.
- Molla S, Yitayal M, Amare G. Health-Related Quality of Life and Associated Factors Among Adult Patients with Heart Failure in Wolaita Zone Governmental Hospitals, Southern Ethiopia. *Risk Manag Healthc Policy*. 2021;14:263-71. [PubMed ID: 33519251]. [PubMed Central ID: PMC7837586]. <https://doi.org/10.2147/RMHP.S288326>.
- Costa LL, Islam MS, Anowar MN, Latif MA. Quality of Life of Chronic Heart Failure Patients. *Open J Nurs*. 2020;10(9):831-57. <https://doi.org/10.4236/ojn.2020.109058>.
- Kawecka-Jaszcz K, Kloczek M, Tobiasz-Adamczyk B, Bulpitt CJ. *Health-Related Quality of Life in Cardiovascular Patients*. Springer; 2013. <https://doi.org/10.1007/978-88-470-2769-5>.
- Hoekstra T, Lesman-Leegte I, van Veldhuisen DJ, Sanderman R, Jaarsma T. Quality of life is impaired similarly in heart failure patients with preserved and reduced ejection fraction. *Eur J Heart Fail*. 2011;13(9):1013-8. [PubMed ID: 21712287]. <https://doi.org/10.1093/eurjhf/hfr072>.
- Proudfoot C, Fonseca AF, Lahoz R, Corda S, Cotton S, Jackson J, et al. Patients with heart failure and a LVEF less than 40% present an overall lower health related quality of life than those with LVEF between 40% and 60%: a multinational real-world survey in EU. *Eur Heart J*. 2020;41(Supplement\_2). <https://doi.org/10.1093/ehjci/ehaa946.0974>.

21. Pudiarifanti N, Pramantara ID, Ikawati Z. [Factors Affecting the Quality of Life of Chronic Heart Failure Patients]. *J Farm Manag Ser*. 2015;**5**(4):259-66. Indonesian.
22. Comin-Colet J, Anguita M, Formiga F, Almenar L, Crespo-Leiro MG, Manzano L, et al. Health-related Quality of Life of Patients With Chronic Systolic Heart Failure in Spain: Results of the VIDA-IC Study. *Rev Esp Cardiol (Engl Ed)*. 2016;**69**(3):256-71. [PubMed ID: [26725973](#)]. <https://doi.org/10.1016/j.rec.2015.07.030>.
23. Gastelurrutia P, Lupon J, Moliner P, Yang X, Cediel G, de Antonio M, et al. Comorbidities, Fragility, and Quality of Life in Heart Failure Patients With Midrange Ejection Fraction. *Mayo Clin Proc Innov Qual Outcomes*. 2018;**2**(2):176-85. [PubMed ID: [30225447](#)]. [PubMed Central ID: [PMC6124320](#)]. <https://doi.org/10.1016/j.mayocpiqo.2018.02.004>.
24. Mzoughi K, Zairi I, Marwa C, Belkahla N, Bouzidi H, Kamoun S, et al. Hypertension and Quality of Life of Patients with Heart Failure. *J Hypertens*. 2022;**40**(Suppl 1). e71. <https://doi.org/10.1097/01.hjh.0000835880.77150.b7>.