



Analysis of Factors Affecting the Quality of Life of STEMI Patients with Primary Percutaneous Coronary Intervention (PPCI)

Jenal Abidin¹, Saifurrohman², Heri Kristianto³

¹ Master of Nursing Programme, Faculty of Health Sciences, Universitas Brawijaya, Malang, Indonesia

² Department of Nursing, Faculty of Health Sciences, Universitas Brawijaya, Malang, Indonesia

³ Integrated Heart Service Installation, dr. Saiful Anwar General Hospital Malang, Indonesia

ARTICLE INFO

Article history:

Received 10 October 2022

Accepted 31 January 2023

Published 20 March 2023

Keyword:

Factors that affect the quality of life of STEMI patients
Primary Percutaneous Coronary (PPCI)

*) corresponding author

Jenal Abidin

Master of Nursing Programme, Faculty of Health Sciences,
Brawijaya University,
Jl. Veterans, Malang, East Java, Indonesia 65145

Email: jay.dila.mtr@gmail.com

DOI: 10.30604/jika.v8i1.1673

Copyright 2023 @author(s)

ABSTRACT

Objective: To describe the published literature on Factors Affecting the Quality of Life of STEMI Patients Undergoing Primary Percutaneous Coronary Intervention (PPCI). **Design:** Scooping review. **Methods:** Searching for literature from several databases such as ProQuest, ScienceDirect, and Google Scholar; then, the articles are identified with the PRISMA flow. Data were extracted on the author, year, research method, setting, sample size, reported factors, and quality of life questionnaire used. **Results:** A literature search from the database yielded a total of 987 literature and 12 research articles that matched the inclusion criteria. Six factors affecting the quality of life of STEMI patients with Primary Percutaneous Coronary Intervention (PPCI): (a) STEMI, (b) age, (c) gender, (d) Killip, (e) GRACE, (f) coronary lesions, (g) disease: DM and HT.

This open access article is under the [CC-BY-SA](https://creativecommons.org/licenses/by-sa/4.0/) license.



INTRODUCTION

Cardiovascular disease is a disease caused by disturbances in the function of the heart and blood vessels, one of which is Acute Coronary Syndrome. Acute Coronary Syndrome (ACS) is a major cardiovascular disease with a high mortality rate and is the leading cause of death worldwide (Patricia, Suling, & Suling, 2018; PERKI, 2018). ACS occupies the 7th position as the highest non-communicable disease in Indonesia, where around 1.5% of the population, or 2,650,340 people, are diagnosed by doctors based on symptoms who have ACS in Indonesia. In addition, it is estimated that deaths caused by cardiovascular disease, especially coronary heart disease and stroke, will continue to increase, reaching 23.3 million deaths in 2030 (Ministry of Health RI, 2014).

ACS can be caused by coronary blood flow that stops suddenly due to occlusion caused by the rupture of atheromatous plaques in the coronary arteries, resulting in disruption of blood flow to the myocardium resulting in significant and ongoing ischemia (Liwang, Yuswar, Wijaya, & Sanjaya, 2020; Patricia et al., 2018; PERKI, 2018). This disease can be divided into three main parts, namely Acute Myocardial Infarction with ST-Segment Elevation Myocardial Infarction (STEMI), Non-ST Segment Elevation Myocardial Infarction (NSTEMI), and Unstable Angina Pectoris (UAP) enforced by history with symptoms of typical chest pain, electrocardiogram examination. In ACS without ST-segment elevation (UAP and NSTEMI), thrombus formation occurs with partial occlusion. In STEMI, the thrombus that forms causes total occlusion in the lumen of the coronary blood vessels (Liwang et al., 2020).

STEMI is an event of total occlusion of the coronary arteries that can cause extensive myocardial infarction and is characterized by a persistent increase in the ST segment of at least two adjacent leads on the electrocardiogram. Clinically that, can be found in patients is prolonged ischemic chest pain at rest (Loscalzo, 2010). Acute myocardial infarction is still one of the leading causes of death worldwide. Among these patients, ST-elevation myocardial infarction (STEMI) has the highest mortality rate among other types of myocardial infarction. The mortality rate is significantly increased when myocardial infarction patients experience bleeding events. Until now, there is no specific bleeding risk assessment tool to predict bleeding events in STEMI patients (Widodo WA, Soerianata S, Joesoef AH, Harimurti GM, 2015). This situation requires immediate revascularization to restore blood flow and myocardial reperfusion (PERKI, 2018). Reperfusion therapy can be performed through percutaneous coronary intervention (PCI) or fibrinolytic therapy. Reperfusion therapy should be implemented in patients with acute myocardial infarction as soon as possible. According to the European Society of Cardiology (ESC) 2017, the primary PCI must be carried out in less than 60 minutes from the time the STEMI diagnosis is made at the primary PCI center. Whereas in hospital facilities that do not yet have a primary PCI center, if the distance to the nearest primary PCI center facility exceeds 120 minutes, then fibrinolytic therapy will be a reperfusion option (Collet et al., 2021).

STEMI has a typical symptom of ischemia infarction which is associated with an ECG picture in the form of persistent ST-segment elevation. The incidence of STEMI is inseparable from various risk factors and the management of reperfusion received by the patient. STEMI risk factors are grouped into modifiable and non-modifiable risk factors. The non-modifiable risk factors include age, family history of cardiovascular disease, and gender. Meanwhile, modifiable risk factors include hypertension, dyslipidemia, smoking, diabetes mellitus (DM), obesity, physical inactivity, and alcoholism. From a literature search, it was found that the factors affecting the quality of life of STEMI patients with Primary Percutaneous Coronary Intervention are STEMI, age, sex, Killip, GRACE, coronary lesions, and diseases: DM and hypertension.

Efforts to control risk factors for acute myocardial infarction consist of primary and secondary prevention (Doniawan K., 2021). Primary prevention is aimed at reducing the number of first-time events, and secondary prevention is aimed at reducing recurrence in patients who have already been treated; secondary prevention focuses on lifestyle changes and rehabilitation after a heart attack. Nurses play an essential role in this control (PP&PL, Ministry of Health RI, 2011).

Quality of life is an individual's perception of their position in life, in the cultural context, the value system in which they are located, and their relationship to life goals, expectations, standards, and so on. Issues that cover a comprehensive quality of life include biological or physical, psychological, sociocultural, and spiritual aspects. Spiritual support can be in the form of solid beliefs or positive energy, which can make a person calmer, and emotionally the patient can become relaxed and peaceful, and have other positive feelings which significantly affect his physical health. Quality of life is a multidimensional concept including physical, social, and psychological dimensions related to disease and therapy. Many factors influence a person's quality of life, such as health, economics, environment, security, etc. Thus the physical and emotional disturbances of acute myocardial infarction can be

permanent and, in many cases, affect and damage lifestyles, thereby reducing the quality of life in the long term (Jacob and Sandjaya, 2018).

Based on the background above, the researchers are interested in conducting a scoping review of the factors influencing the quality of life of STEMI patients with primary percutaneous coronary intervention (PPCI).

Methods

This research was conducted according to the Preferred Reporting Items for Systematic Review guidelines (PRISMA), and a data-based literature search was conducted in November 2022 to find reputable journal articles. The literature is restricted to years published from 2010 to 2022 and was systematically reviewed to obtain empirical evidence regarding factors affecting the quality of life of STEMI patients with PPCI. A literature search was conducted through databases such as ProQuest, ScienceDirect, and Google Scholar using a combination of the keywords: "influencing factors", "quality of life", "STEMI", and "Primary Percutaneous Coronary", with Boolean search methods such as "AND", "OR", and "NO" to get articles according to the purpose of the literature review. The inclusion and exclusion criteria determination is based on the PICOS method (population, intervention, comparison, results, and study design) shown in Table 1. Based on the results of a literature search through publications in three databases, 987 articles matched the keywords used. Furthermore, after checking for duplication, 315 articles had similar content and were excluded, leaving 611. The articles were further filtered based on title and abstract to obtain 296 relevant articles. Next, papers were filtered based on full text, which resulted in 174 suitable articles. The eligibility assessment of 174 articles was based on the entire text and conformity with the eligibility criteria. Therefore, 162 articles were unsuitable, and only 12 could be used in the literature review. The study selection results are illustrated in a flowchart using the PRISMA selection process in Figure 1. In each of the studies included in the review,

Table 1
Inclusion and exclusion criteria

Criteria	Inclusion	Exclusion
P	Research focusing on STEMI patients	- NSTEMI patients
I	Studies discussing Primary Percutaneous Coronary Intervention (PPCI)	Research that addresses factors outside of Primary Percutaneous Coronary Intervention (PPCI)
C	-	-
O	The study aims to explain the factors that affect the quality of life of STEMI patients with PPCI.	Research that discusses the factors that affect the quality of life of STEMI patients with fibrinolytic reperfusion.
S	The research design is observational, cross-sectional, or experiment	qualitative, conference abstracts, dissertation articles, editorials

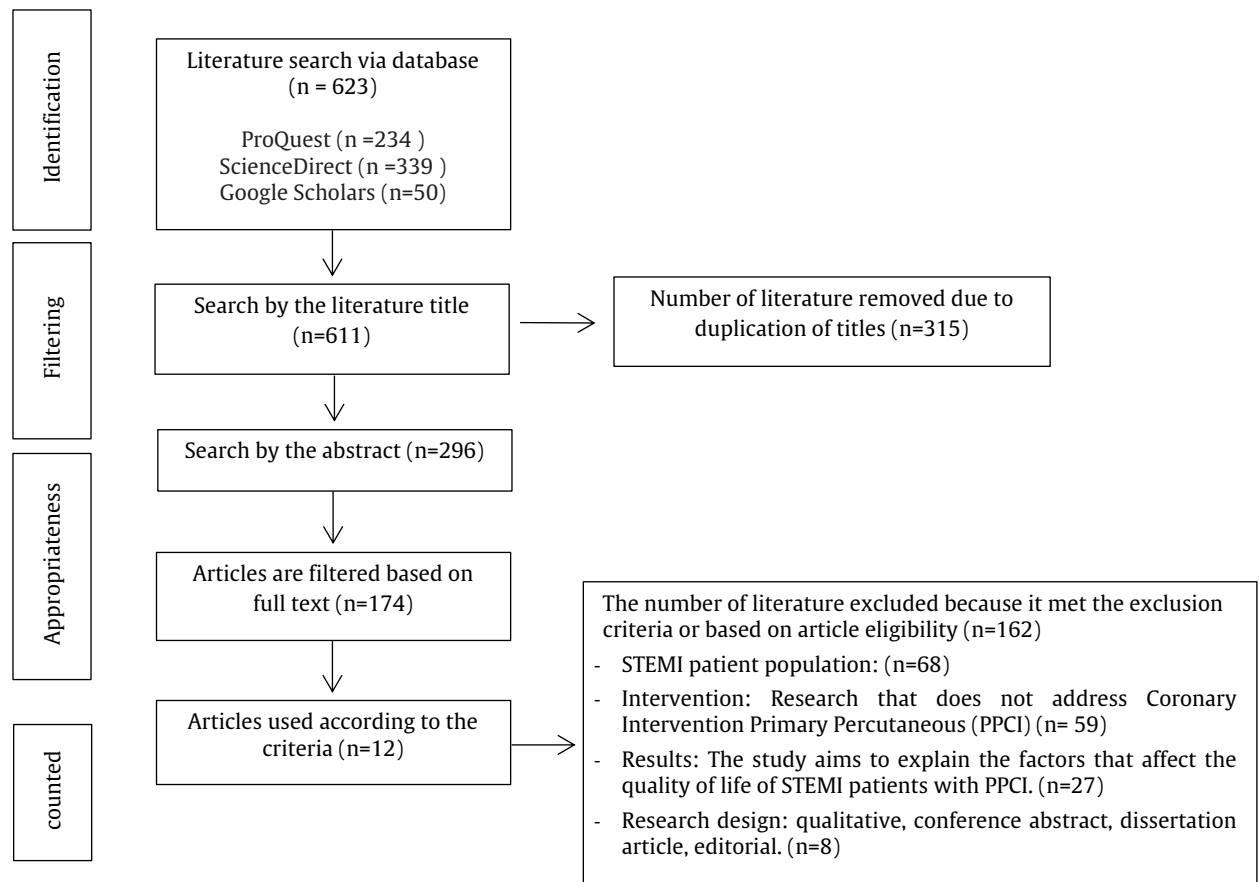


Figure 1. Flow chart of literature search using PRISMA guidelines

Table 2
 Studies on factors affecting the quality of life of STEMI patients with PPCI

Author/year	Research purposes	Study methods	Number of samples	Reported factors affecting the quality of life with PPCI
1 Putra S., Elfi EF., Afdal, 2018	To find out the description of risk factors and reperfusion management of STEMI patients in the heart ward of Dr. M. Djamil Padang.	Retrospective descriptive	108 patients	Most STEMI patients had risk factors <3, as many as 99 samples (54.7%) with the highest distribution of patients in the age group 45 - 54 years (38.7%) and male sex (62.3%), smoking in 122 samples (67.4%), and hypertension in 98 samples (52.5%) and received fibrinolytic therapy for <12 hours in 28 people (100%). Only 17 people (21.3%) received PCI therapy within < 12 hours, and 63 people (78.7%) received PCI therapy within > 12 hours. So the management of reperfusion in STEMI patients in the Heart Ward of RSUP Dr. M. Djamil in 2013-2014 mostly performed PCI, but most of these PCI procedures were not carried out within 12 hours after the patient's complaint.
2 Fadil M., 2021	To determine the relationship between total ischemic time and KKM in STEMI patients undergoing PPCI	Cross-sectional	136 patients	total ischemic time <180 minutes was in 13 (9.55%) patients, the number of patients in the total ischemic time group of 180-360 minutes was in 48 (35.30%) patients, and the number of patients in the total ischemic time group >360-720 minutes was in 75 (55.15%) patients. The chance of survival of patients in the longest total ischemic time, i.e., >360-720 minutes, was lower than the other two groups; the difference was statistically significant (p=0.019).

3	Yudha MHD., Baharsyah M., 2019	To know the factors associated with KKM during treatment in STEMI patients undergoing PPCI at RSUP Dr. M. Djamil Padang	Comparative cross-sectional	112 patients	a significant difference between the KKM and non-KKM groups on age characteristics (64.7 ± 9.51 years vs. 57.67 ± 9.66 years, $p = 0.009$), length of stay (5.26 ± 4.17 days vs. 2.56 ± 0.93 days, $p=0.006$), pneumonia (70.4% vs. 14.8%, $p=0.000$), acute kidney injury (40.7% vs. 11.1%, $p=0.030$), Killip class (63% vs. 25.9%, $p=0.014$), creatinine (1.57 ± 0.77 mg/dL vs. 1.05 ± 0.21 mg/dL, $p=0.007$), urea ($40.33 \pm 26,67$ mg/dL vs. 23.52 ± 6.66 mg/dL, $p=0.003$) and coronary occlusion severity (55.6% vs. 7.4%, $p=0.000$)
4	Wibowo TH., 2019	To determine the effect of age and quality of life among myocardial infarction patients	Correlational descriptive with the cross-sectional approach	69 patients	Age does not affect the quality of life of myocardial infarction patients. The instrument was adapted from the MacNew Quality of Life After Myocardial Infarction (MacNew QLMI) questionnaire to measure the quality of life for myocardial infarction.
5	Kang K., Gholizadeh L., Han HR., 2021	To investigate the health-related quality of life (HRQoL) of Korean patients in the acute phase of myocardial infarction (MI)	Prospective	150 patients	Respondents with higher education levels and better financial status have better HRQoL. Diabetes, a history of stroke, other heart diseases, and a higher DASS score of 21 are associated with HRQoL.
6	Arina Papita Simanungkalit, Alice Inda Supit, 2022.	To determine the characteristics and course of the disease of patients diagnosed with STEMI without reperfusion treatment at a peripheral hospital.	Observational with a cross-sectional study design	56 patients	There were 22 (39.28%) patients experienced STEMI accompanied by comorbidities and/or complications. The accompanying comorbidities include chronic heart failure, type II DM, hypertension, acute pulmonary edema, cardiogenic shock, and dyslipidemia. The management of patients with STEMI without a reperfusion strategy causes persistent complaints during treatment and increases the patient's re-admission to the hospital with the same complaint.
7	Longpre C., et al, 2022	To find out whether gender, sociocultural, biological, stress, and allostatic load affect the quality of life of STEMI patients	Prospective	1200 patients	Women have greater dysregulation in neuroendocrine and immune function. Thus gender-related factors may contribute to the pathogenesis of cardiovascular disease primarily through stress mechanisms.
8	ZhangS., et al., 2022	To characterize the care pathway of post-MI patients and understand barriers to referral for further SCD risk stratification and management in patients who meet referral criteria	Prospective	1491 patients	We found that 40% of patients who met the criteria were not referred for further risk stratification and management of Sudden Cardiac Death (SCD), and 85% of patients met the indications for implantable cardioverter-defibrillators (ICD) did not receive an ICD as directed by the guidelines. Quality of life for patients with SCD or ICD implants varies by geography, indicating that improvement will require a doctor- and patient-focused approach.
9	Ando H., et al., 2022	To characterize AMI in young patients undergoing primary percutaneous coronary intervention (PCI)	Retrospective cohort	213,297	Among 213,297 patients with AMI who underwent primary PCI, 23,985 (11.2%) were young (ages 20 to 49 years). Compared with the older group (ages 50 to 79 years; $n = 189,312$), the younger group included a higher number of men, smokers, patients with dyslipidemia, and patients with single-vessel disease, and a lower number of patients with hypertension and diabetes.
10	Endang J., et al., 2014	To determine whether hemostatic factors,	Retrospective cohort	55 patients	Fibrinogen levels at admission had no relationship to IMR in STEMI patients

		especially fibrinogen levels, are thought to have an essential role in microvascular obstruction through hypercoagulation and distal embolization mechanisms.			undergoing PPCI.
11	Wibowo 2019	TH., To determine the effect of age and quality of life among myocardial infarction patients.	Correlational descriptive with the cross-sectional approach	69 patients	The middle age group was 66,7 %. Quality of life for the physical domain has an average weighted mean of 4.51. The results of the data analysis using the Mann-Whitney test obtained were emotional domain $p=0,995$ ($p<0,05$), physical domain $p=0,624$ ($p<0,05$), and social domain $p=0,191$ ($p<0,05$). It means that age does not influence patients' quality of life with myocardial infarction.
12	Pratiwi AT., 2018	To see the relationship between non-patient factors and pre-hospital delays from the decision to the arrival at RSUD dr. Saiful Anwar Malang.	Analytical observational with cross-sectional approach method.	88 patients	Sociodemographic characteristics, clinical history, cost factors, transportation, and ECG procedures were not significantly related to the patient's delayed arrival at the hospital ($p>0.05$). However, in residential areas, choosing a primary health facility as the first medical contact and experiencing an attack for the first time was significantly associated with patient delays in arriving at the hospital ($p<0.05$).

Results and Discussion

A database search resulted in a final selection of 12 articles related to factors affecting the quality of life of STEMI patients with PPCI. The article is an article with a cross-sectional study design (41.7% or 5/12), prospective study (25% or 3/12), retrospective study (25% or 3/12), and research before and after intervention (8, 3% or 1/12). The samples from the above articles ranged from 55 to 213,297, with a total sample of 216,831. Based on the analysis of the 12 journals above, it can be found several things related to research on the quality of life of STEMI patients, as follows:

STEMI is an event of total occlusion of the coronary arteries that can cause extensive myocardium infarction and is characterized by a persistent increase in the ST segment of at least two adjacent leads on the electrocardiogram. Clinically that can be found in patients is prolonged ischemic chest pain at rest (Ketut SI., Kiki WP., Pratama, 2022). The patient's quality of life can be determined by the clinical findings that can be found in the patient, namely prolonged ischemic chest pain at rest. Then it requires immediate revascularization measures to restore blood flow and myocardial reperfusion (PERKI, 2018). Reperfusion therapy can be performed through percutaneous coronary intervention (PCI) or fibrinolytic therapy. Reperfusion therapy should be implemented in patients with acute myocardial infarction as soon as possible. According to the European Society of Cardiology (ESC) 2017, the primary PCI must be carried out in less than 60 minutes from the time the STEMI diagnosis is made at the primary PCI center. Whereas in hospital facilities that do not yet have a primary PCI center, if the distance to the nearest primary PCI center facility exceeds 120 minutes, then fibrinolytic therapy will be a reperfusion option (Collet et al., 2021).

Researchers found heterogeneous results of the factors that affect the quality of life of STEMI patients with PPCI. From the results of the literature review, we found six factors that affect the quality of life of STEMI patients with primary PCI: (a) STEMI, (b) age, (c) sex, (d) Killip, (e) GRACE, (f) coronary lesion, (g) disease: DM, HT.

From the results of the review that has been carried out, the factors that influence the quality of life of STEMI patients are the age characteristics of the respondents in the age range of 45 - 54 years (38.7%) and male sex (62.3%), smoking, namely 122 samples (67.4%) and hypertension in 98 samples (52.5%) and received fibrinolytic therapy for <12 hours, 28 people (100%). Only 17 people (21.3%) received PCI therapy within < 12 hours, and > 12 hours, as many as 63 people (78.7%). Most PCI procedures were not performed within 12 hours after the patient's complaint. Longpre C. et al., 2022 explained that women have more significant neuroendocrine and immune function dysregulation. Thus gender-related factors may contribute to the pathogenesis of cardiovascular disease primarily through stress mechanisms. Age is an important determinant of STEMI patients with PPCI. Age is a very strong and non-modifiable factor in the occurrence of STEMI. With increasing age, the susceptibility of individuals to coronary atherosclerosis increases. Increasing age causes changes in the coronary arteries. The main changes that occur are intimal thickening and fibrosis of the tunica media. Age also affects exposure to other factors that increase the risk of coronary heart disease. Age included as a risk factor for STEMI is >45 years for men and >55 years for women. Research conducted by Cipto Susilo (2015) also found the distribution pattern of the sexes to be the same; most respondents were male, namely as much as 80%, and only 20% were female. Coronary atherosclerosis is more prone to occur in men than women. Middle-aged men have a higher prevalence of myocardial infarction than women of the same age. The development of cardiovascular disease in women is 7 to 10 years late compared to the age at which

cardiovascular disease develops in men. It is presumably due to premenopausal women having estrogen, which provides a protective effect from cardiovascular disease, and they become vulnerable after experiencing menopause. STEMI with a history of DM having a KGD >130 mg/dl is one of the causes of cardiovascular mortality in diabetic patients. Fluctuations in blood glucose levels and chronic hyperglycemia trigger an inflammatory response through increased endoplasmic reticulum stress and mitochondrial superoxide production. The molecular pathways underlying this condition are involved in the pathogenesis of endothelial dysfunction, which represents the first step of atherogenesis. Through this pathway, hyperglycemia-induced early atherogenesis may lead to a possible increased risk of cardiovascular events later in life. Disciplined regulation of blood sugar levels can be carried out as a preventive effort to overcome the risk of cardiovascular events in diabetic patients. Maintaining blood sugar levels at normal levels with pharmacotherapy and treatment of related factors can reverse the remodeling process and may be effective in preventing further cardiac events. Maintaining normoglycemic conditions can reduce oxidative stress and inflammation in patients with myocardial infarction, illustrating the possibility of lowering apoptosis in the area around infarction and remodeling. Maintaining this normoglycemic state may also enhance ischemic myocardial regeneration by reducing aged cardiomyocyte precursors.

Arina Papita Simanungkalit and Alice Inda Supit (2022) explained that hyperglycemia could cause oxidative stress through several mechanisms, one of which is through non-enzymatic glycation reactions. Glycosylation is a reaction between protein and glucose at high concentrations, called the Maillard reaction. The Maillard reaction forms Advanced Glycation End products (AGEs) and Advanced Oxidation Protein Products (AOPP). The formation of these compounds indicates oxidative stress, which disrupts the balance of oxidants and antioxidants in the body, increasing free radicals. These free radicals can damage lipids, proteins, or DNA and modulate intracellular signaling pathways. This oxidative stress can also increase the expression of pro-inflammatory and pro-coagulant factors, induce apoptosis and interfere with nitric oxide release. This condition caused by oxidative stress causes a wider risk of myocardial infarction in diabetic patients.

Uncontrolled hypertension can lead to left ventricular hypertrophy. Left ventricular hypertrophy is defined as an increase in left ventricular mass. It can be caused by the thickening of the left ventricular wall, increased left ventricular volume, or both. Left ventricular hypertrophy induced by hypertension is usually characterized by the thickening of the ventricular wall, which may be with or without an increase in ventricular volume. In hypertension, there is an increase in blood pressure in the arteries, which results in the ventricles having to produce enough pressure to exceed the blood pressure in the arteries. As a result, there is an increase in the workload of the heart. Following La Place's law, an increase in ventricular wall pressure will increase wall stress (wall stress). To reduce this wall tension, compensation occurs through an increase in the thickness of the heart wall. Research conducted by Asdiana et al. (2015) found a positive correlation between blood pressure and the Left Ventricular Mass Index (LVMI) in people with hypertension. LVMI is one of the parameters in diagnosing LVH. So the higher the blood pressure in hypertensive patients, the greater the possibility of left ventricular hypertrophy. Left ventricular dysfunction can arise because the necrotic muscle loses its contractile power, and the

surrounding ischemic muscles experience impaired contractile power.

STEMI patients with clinical constipation result in muscle contractility, which can increase blood pressure, thereby increasing cardiovascular events. The target for successful reperfusion therapy is for chest pain to disappear, ST-elevation to be reduced by >50% in 60-90 minutes, and typical reperfusion arrhythmia (Collet et al., 2021). If failure of fibrinolytic therapy, hemodynamic instability, or re-occlusion or re-infarction with recurrent ST-segment elevation after fibrinolytic therapy is found, immediate angiographic therapy and rescue PCI are required (Collet et al., 2021). Rescue PCI should be performed in patients with high-risk lesions (>75%) with TIMI 2 or patients with suspicion of a large or platelet-rich thrombus (Nguyen, Hu, Chen, & Kim, 2013).

This review has limitations. Literature was not categorized according to research strength based on methodology or sample size, so the factors that significantly contribute to the quality of life of STEMI patients with PPCI cannot be specifically explained. However, this review can still provide information regarding organizational factors that ICU providers must consider. Presentation of data by showing the type of study methodology, the number of samples, and study locations minimize the deficiencies above. And the selection of literature based on a relatively wide range of years is also our strength in broadening the conceptualization that affects the quality of life of STEMI patients with PPCI.

Conclusion

This literature review identified factors that affect the quality of life of STEMI patients, namely gender; women have more significant dysregulation in neuroendocrine and immune function. Gender can contribute to the pathogenesis of the cardiovascular disease, especially through the mechanism of stress. Hyperglycemia can cause oxidative stress, so the quality of life depends on the extent of myocardial infarction in diabetic patient. In addition, left ventricular dysfunction in hypertension causes necrotic muscles to lose their contraction power, and the surrounding ischemia muscles will experience interference of contraction power. So the target for the success of PPCI reperfusion therapy is for chest pain to disappear, ST elevation to be reduced by >50% in 60-90 minutes, and typical reperfusion arrhythmia.

REFERENCES

- Amsterdam, E. A., Wenger, N. K., Brindis, R. G., Casey, D. E., Ganiats, T. G., Holmes, D. R., Jaffe, A. S., Jneid, H., Kelly, R. F., Kontos, M. C., Levine, G. N., Liebson, P. R., Mukherjee, D., Peterson, E. D., Sabatine, M. S., Smalling, R. W., Zieman, S. J., Anderson, J. L., Halperin, J. L., ... Yancy, C. W. (2014). 2014 AHA/ACC Guideline for the management of patients with non-ST-elevation acute coronary syndromes: Executive summary: A report of the American college of cardiology/American heart association task force on practice guidelines. In *Circulation* (Vol. 130, Issue 25). <https://doi.org/10.1161/CIR.000000000000133>

- Arovah, N. I., & Heesch, K. C. (2020). *Verification of the Reliability and Validity of the Short Form 36 Scale in Indonesian Middle-aged and Older Adults*. 180–188.
- Crea, F., & Liuzzo, G. (2013). Pathogenesis of acute coronary syndromes. *Journal of the American College of Cardiology*, 61(1), 1–11. <https://doi.org/10.1016/j.jacc.2012.07.064>
- Collet, J. P., Thiele, H., Barbato, E., Bauersachs, J., Dendale, P., Edvardsen, T., ... Siontis, G. C. M. (2021). 2020 ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation. *European Heart Journal*, 42(14), 1296–1336. <https://doi.org/10.1093/eurheartj/ehaa575>
- Dharma, S., Andriantoro, H., Dakota, I., Purnawan, I., Pratama, V., Isnaniyah, H., Yamin, M., Bagus, T., Hartono, B., Ratnaningsih, E., Suling, F., & Basalamah, M. A. (2015). Organisation of reperfusion therapy for STEMI in a developing country. *Open Heart*, 2(1), e000240. <https://doi.org/10.1136/openhrt-2015-000240>
- Gale, C. P., Van Laar, M., & Hamm, C. (2015). Acute myocardial infarction and inter-hospital transfer. *Heart*, 101(13), 998–999. <https://doi.org/10.1136/heartjnl-2015-307508>
- Guo, Q., Huang, J., Shen, Y., Tong, G., Li, H., & Meng, S. (2020). *The role of late reperfusion in ST-segment elevation myocardial infarction: a real-world retrospective cohort study*. 1–9.
- Gulati, M., Levy, P. D., Mukherjee, D., Amsterdam, E., Bhatt, D. L., Birtcher, K. K., ... Shaw, L. J. (2021). 2021 AHA/ACC/ASE/CHEST/SAEM/SCCT/SCMR Guideline for the Evaluation and Diagnosis of Chest Pain: A Report of the American College of Cardiology/American Heart Association Joint Committee on Clinical Practice Guidelines. *Circulation* (Vol. 124–143). <https://doi.org/10.1161/CIR.0000000000001029>
- Ibanez. (2018a). 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation. *European Heart Journal*, 39(2), 119–177. <https://doi.org/10.1093/eurheartj/ehx393>
- Ibanez. (2018b). 2017 ESC Guidelines for the management of acute myocardial infarction in patients presenting with ST-segment elevation: The Task Force for the management of acute myocardial infarction in patients presenting with ST-segment elevation of the European Socie. *European Heart Journal*, 39(2), 119–177. <https://doi.org/10.1093/eurheartj/ehx393>
- Karimullah, Tjahjono, C. T., & Widito, S. (2020). *Heart Science Journal*. 1(July), 24–31.
- Kemenkes RI. (2014). Situasi kesehatan jantung. Pusat Data Dan Informasi Kementerian Kesehatan RI, 3. <https://doi.org/10.1017/CBO9781107415324.004>
- Kofoed, K. F., Kelbæk, H., Riis Hansen, P., Torp-Pedersen, C., Høfsten, D., Kløvgård, L., Holmvang, L., Helqvist, S., Jørgensen, E., Galatius, S., Pedersen, F., Bang, L., Saunamaki, K., Clemmensen, P., Linde, J. J., Heitmann, M., Wendelboe Nielsen, O., Raymond, I. E., Peter Kristiansen, O., ... Engstrøm, T. (2018). Early versus standard care invasive examination and treatment of patients with non-ST-segment elevation acute coronary syndrome verdict randomized controlled trial. *Circulation*, 138(24), 2741–2750. <https://doi.org/10.1161/CIRCULATIONAHA.118.037152>
- Lins, L., & Carvalho, F. M. (2016). SF-36 total score as a single measure of health-related quality of life: Scoping review. *SAGE Open Medicine*, 4, 205031211667172. <https://doi.org/10.1177/2050312116671725>
- Liwang, F., Yuswar, patria w, Wijaya, E., & Sanjaya, nadira p. (2020). *Kapita Selekt Kedokteran Edisi V*. Jakarta: Media Aesculapius.
- Loscalzo, J. (2010). *Harrison's Cardiovascular Medicine*. Mc Graw Hill Medical. <https://doi.org/10.1002/9780470745465.ch3>
- Ludman, P. (1998). Primary angioplasty. In *Hospital medicine (London, England: 1998)* (Vol. 59, Issue 7). <https://doi.org/10.3109/9781841847351-12>
- Nakane, Y., Tazaki, M., & Miyaoka, E. (1999). Whoqol. *Iryo To Shakai*, 9(1), 123–131. https://doi.org/10.4091/iken1991.9.1_123
- Neumann, F. J., Sousa-Uva, M., Ahlsson, A., Alfonso, F., Banning, A. P., Benedetto, U., Byrne, R. A., Collet, J. P., Falk, V., Head, S. J., Jüni, P., Kastrati, A., Koller, A., Kristensen, S. D., Niebauer, J., Richter, D. J., Seferovic, P. M., Sibbing, D., Stefanini, G. G., ... Roffi, M. (2019). 2018 ESC/EACTS Guidelines on myocardial revascularization. *European Heart Journal*, 40(2), 87–165. <https://doi.org/10.1093/eurheartj/ehy394>
- Nuraeni. (2016). Faktor yang Memengaruhi Kualitas Hidup Pasien dengan Penyakit Jantung Koroner Factors Influenced the Quality of Life among Patients Diagnosed with Coronary Heart Disease. *Jurnal Keperawatan Unpad*, 4, 107–116.
- Pada, K., Yang, P., Di, B., Sakit, R., Pusat, U., Manado, D. K., Kesehatan, F., Universitas, M., & Ratulangi, S. (2018). HUBUNGAN ANTARA HIPERTENSI DENGAN KEJADIAN PENYAKIT JANTUNG KORONER PADA PASIEN YANG BEROBAT DI RUMAH SAKIT UMUM PUSAT Prof. Dr. R. D. KANDOU MANADO. *Kesmas*, 7(4).
- Park, J.-H., & Lee, E.-K. (2021). Nursing practice today. *Nursing Practice Today*, 8(2), 132–138. <http://npt.tums.ac.ir/index.php/npt/article/view/132>
- Patricia, M. I., Suling, F. R. ., & Suling, T. E. (2018). Prevalensi dan Faktor Risiko Sindrom Koroner Akut di Rumah Sakit Umum Universitas Kristen Indonesia. *Majalah Kedokteran UKI*, 35(3), 1101–1114
- Perki. (2018). *Pedoman Tatalaksana Sindrom Koroner Akut. Edisi IV*.
- Perwitasari, D. A. (2012). *Short Communication DEVELOPMENT THE VALIDATION OF INDONESIAN VERSION OF SF-36 QUESTIONNAIRE IN CANCER DISEASE*. 23(4), 248–253.
- Pinto, S., Fumincelli, L., Mazzo, A., Caldeira, S., & Martins, J. C. (2017). Comfort, well-being and quality of life: Discussion of the differences and similarities among the concepts. *Porto Biomedical Journal*, 2(1), 6–12. <https://doi.org/10.1016/j.pbj.2016.11.003>
- Pujowaskito. (2021). Quality of Life Comparison in STEMI Patients with Percutaneous Coronary Intervention (PCI) and Non-PCI in Dustira Hospital. *Proceedings of the 12th Annual*

- Scientific Meeting, Medical Faculty, Universitas Jenderal Achmad Yani, International Symposium on "Emergency Preparedness and Disaster Response during COVID 19 Pandemic" (ASMC 2021), 37(Asmc), 266–278.*
<https://doi.org/10.2991/ahsr.k.210723.061>
- Riskesdas. (2018). Laporan Nasional Riskesdas. *Kemertian Kesehatan Republik Indonesia Dan Badan Penelitian Dan Pengembangan Kesehatan.*
- Sarini, & Suharyo. (2018). Faktor Risiko Yang Berhubungan dengan Kejadian Stroke. *Jurnal Kesehatan Masyarakat Nasional, 3*(1), 153–164.
- Schwertani, A., Choi, H. Y., & Genest, J. (2018). HDLs and the pathogenesis of atherosclerosis. *Current Opinion in Cardiology, 33*(3), 311–316.
<https://doi.org/10.1097/HCO.0000000000000508>
- Skevington, S. M., Lotfy, M., & O'Connell, K. A. (2004). The World Health Organization's WHOQOL-BREF quality of life assessment: Psychometric properties and results of the international field trial. A Report from the WHOQOL Group. *Quality of Life Research, 13*(2), 299–310.
<https://doi.org/10.1023/B:QURE.0000018486.91360.00>
- Suhayatra Putra,, Eka Fithra Elfi, Afdal, 2018, Gambaran Faktor Risiko dan Manajemen Reperfusi Pasien IMA-EST di Bangsal Jantung RSUP Dr. M. Djamil Padang, <http://jurnal.fk.unand.ac.id/>
- Task, A., Members, F., Hamm, C. W., Germany, C., Co-chairperson, J. B., Poland, D. D., Germany, S. G., Uk, M. C. P., Sonntag, F., Sousa, M., Uk, R. F. S., Wijns, W., Israel, D. Z., Crea, F., France, N. D., & Denmark, E. F. (2011). *ESC GUIDELINES ESC Guidelines for the management of acute coronary syndromes in patients presenting without persistent ST-segment elevation The Task Force for the management of acute coronary syndromes (ACS) in patients presenting without persistent ST- 2999–3054.*
<https://doi.org/10.1093/eurheartj/ehr236>
- The World Health Organization, (THE WHOQOL-100 and the whoqol-bref). (1997). Measuring quality of life the. *Programme on Mental Health.*
- Thygesen, K., Alpert, J. S., Jaffe, A. S., Chaitman, B. R., Bax, J. J., Morrow, D. A., White, H. D., Corbett, S., Chettibi, M., Hayrapetyan, H., Roithinger, F. X., Aliyev, F., Sujayeva, V., Claeys, M. J., Smajčić, E., Kala, P., Iversen, K. K., Hefny, E. El, Marandi, T., ... Parkhomenko, A. (2018). Fourth Universal Definition of Myocardial Infarction (2018). In *Circulation* (Vol. 138, Issue 20).
<https://doi.org/10.1161/CIR.0000000000000617>
- Tsai, I. T., Wang, C. P., Lu, Y. C., Hung, W. C., Wu, C. C., Lu, L. F., Chung, F. M., Hsu, C. C., Lee, Y. J., & Yu, T. H. (2017). The burden of major adverse cardiac events in patients with coronary artery disease. *BMC Cardiovascular Disorders, 17*(1), 1–14. <https://doi.org/10.1186/s12872-016-0436-7>
- Viana, M., Laszczy, O., Araújo, C., Borges, A., Barros, V., Isabel, A., Dias, P., Júlia, M., Moreira, I., Lunet, N., & Azevedo, A. (2020). *coronary syndrome. 39*(3).
<https://doi.org/10.1016/j.repc.2019.07.007>
- Wong, G. C., Welsford, M., Ainsworth, C., Abuzeid, W., Fordyce, C. B., Greene, J., Huynh, T., Lambert, L., Le May, M., Lutchmedial, S., Mehta, S. R., Natarajan, M., Norris, C. M., Overgaard, C. B., Perry Arnesen, M., Quraishi, A., Tanguay, J. F., Traboulsi, M., van Diepen, S., ... So, D. (2019). 2019 Canadian Cardiovascular Society/Canadian Association of Interventional Cardiology Guidelines on the Acute Management of ST-Elevation Myocardial Infarction: Focused Update on Regionalization and Reperfusion. *Canadian Journal of Cardiology, 35*(2), 107–132. <https://doi.org/10.1016/j.cjca.2018.11.031>
- Yuliani, F., Oenzil, F., & Iryani, D. (2014). Hubungan Berbagai Faktor Risiko Terhadap Kejadian Penyakit Jantung Koroner Pada Penderita Diabetes Melitus Tipe 2. *Jurnal Kesehatan Andalas, 3*(1), 37–40. <https://doi.org/10.25077/jka.v3i1.22>
- Zahra. (2019). *The Effect of Self Care Education Based on Orem ' s Nursing Theory on Quality of Life and Self-Efficacy in Patients with Hypertension: 8*(2), 140–149.
<https://doi.org/10.30476/IJCBNM.2020.81690.0.140>