EVALUATION AND CORRELATION OF PATIENT CHARACTERISTICS TOWARDS THE COMPATIBILITY OF HEART FAILURE PATIENTS' BLOOD PRESSURE WITH JNC 7 TARGETS

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Abstract. Heart failure is a major complication of hypertension and is a major cause of morbidity and mortality globally. Proper blood pressure management is essential to prevent the worsening of this condition. This study aims to evaluate the suitability of blood pressure in heart failure patients with the JNC 7 target. This study used a descriptive observational design with a retrospective approach. The sampling technique in this study was carried out by purposive sampling. The sample used in this study was 250 BPJS inpatients with a diagnosis of heart failure at Hospital X, Kudus. The data used were obtained from medical records, including patient characteristics (gender, age, length of stay, comorbidities, and concomitant diseases) and blood pressure. The data were analyzed statistically with univariate and bivariate tests using Spearman's rho test. The results showed that 162 patients (64.8%) achieved the JNC 7 blood pressure target with blood pressure in the range of <110/85–140/90 mmHg, while 88 patients (35.2%) did not achieve the blood pressure target (>140/90 mmHg). The results of statistical tests showed that there was a significant correlation between the compatibility of blood pressure with the JNC target and patient characteristics, with a significance value of 0.000<0.05. Based on these results, it can be concluded that heart failure patients with blood pressure reaching the JNC 7 target were 64.8% and there was a correlation between the compatibility of JNC 7 blood pressure and patient characteristics.

Key words: [Heart failure; JNC 7; Blood Pressure]

INTRODUCTION

Heart failure (HF) is a progressive clinical condition in which the heart is unable to pump enough blood to meet the body's metabolic needs (Rampengan, 2014). This condition is a complex syndrome characterized by high morbidity, decreased quality of life, and significant health care costs. Heart failure can occur due to disorders that reduce ventricular filling (diastolic dysfunction) or reduce the ability of the heart muscle to contract (systolic dysfunction) (Wells et al., 2015).

According to the World Health Organization (WHO, 2021), cardiovascular disease is the leading cause of death globally, with a total of 17.9 million deaths each year. Heart failure contributes to 85% of deaths. The prevalence of heart failure in Indonesia is reported to be higher than in European countries, with a percentage of >5% (Hasanah et al., 2023). The 2018 Basic Health Research (Riskesdas) stated that the national prevalence of heart failure diagnosed by doctors reached 1.5%, and in Central Java Province, it was reported to be 1.6% (Ministry of Health of the Republic of Indonesia, 2018). Heart failure has risk factors such as age, diabetes mellitus, chronic kidney disease, and hypertension, which play a major role in the development of heart failure (Siswanto et al., 2015). Hypertension is one of the most significant causative factors, where high blood pressure increases the workload of the heart and can cause left ventricular hypertrophy, which eventually develops into heart failure (Moreno et al., 2017). Unstable blood pressure in heart failure patients can worsen heart function and increase the risk of serious complications (Rukminingsih & Susanto, 2020). Based on this, it shows that blood pressure control is needed, referring to one of the guidelines, namely JNC 7.

JNC 7 guidelines recommend that blood pressure be maintained below 140/90 mmHg to reduce cardiovascular risk (Chobanian et al., 2004). Previous studies have shown that the average systolic and diastolic blood pressure in heart failure patients are 133.58 mmHg and 86.5 mmHg, respectively (Febtrina & Malfasari, 2018). Given the importance of blood pressure control in heart failure management, this study aims to evaluate the extent to which BPJS heart failure patients at Hospital X, Kudus, achieved the JNC 7 target and analyze the factors that influence compliance with the target.

METHODS

This study used a descriptive observational design with a retrospective approach. The sampling technique in this study was carried out by purposive sampling, which considered several inclusion criteria. The inclusion criteria in this study include: 1) Complete and legible medical records of BPJS inpatients with a diagnosis of heart failure; 2) Patients aged ≥35 years with or without comorbidities. The population in this study was 662, and sampling was used according to the Slovin formula, as follows:

$$n = \frac{N}{N + 1(e)^2}$$
$$n = \frac{662}{1 + 662(0{,}05)^2}$$
$$n = \frac{662}{1 + 1{,}65}$$
$$n = \frac{662}{2{,}65}$$
$$n = 249{,}34 \text{ (rounded up to 250)}$$

Description:
N= Sample Size
n= Sample Size
e= Inaccuracy tolerance (in percent) of 5%

The sample used in this study was 250 BPJS inpatients with a diagnosis of heart failure at Hospital X, Kudus. The data used were obtained from medical records for the period January-December 2024, which included patient characteristics (gender, age, length of stay, and comorbidities) and blood pressure. The data were analyzed statistically with univariate and bivariate tests using Spearman's rho test.

RESULTS AND DISCUSSION

This study was conducted at Hospital X, Kudus, and has been approved by the Health Research Ethics Committee with Registration Number: 37/KEPK/RSLH/IV/2025. This study reviewed the medical records of 250 BPJS participants who were diagnosed with heart failure and hospitalized.

a. Patient Characteristics

The characteristics of patients in this study can be seen in Table 1.

Table 1. Patient Characteristics

Classification	Total	(%)
Gender		
Male	91	36,4
Female	159	63,6
Age		
Adult (26-45 years)	18	7,2
Older Adult (46-60 years)	165	66
Geriatric (>60 years)	67	26,8
Length of Stay (day)		
≤5	214	85,6
>5	36	14,4
Types of Comorbidities		
Diabetes, Chronic kidney disease, and hypertension	113	45,2
Besides Diabetes, Chronic kidney disease, and hypertension	92	36,8
Total of comorbidities		
≤2	162	64,8
>2	33	13,2

Source: Primary Data (2025)

Based on Table 1, it shows that male heart failure patients are 159 people (63.6%), while patients

are 91 female patients (36.4%). The high prevalence in men can be caused by more comorbidities, such as hypertension and diabetes mellitus. Both of these conditions accelerate the progression of heart failure, especially because of the absence of hormonal protection, such as estrogen, which has a cardioprotective effect on women. This is in line with the findings of Souhoka et al. (2024), which show that lifestyle factors and lack of control of risk factors are the main causes of cardiovascular disease in men.

Based on age characteristics, it shows that the highest number of heart failure patients is aged 46-60 years, as many as 165 patients with a percentage of 66%, while the least is aged 26-45 years, as many as 18 patients with a percentage of 7.2%. This shows that old age is a significant risk factor in the occurrence of heart failure caused by structural and functional changes in the heart due to high blood pressure, which causes an increased risk of diastolic dysfunction in patients. This is in line with research by Ramadhan et al. (2021) and Astuti et al. (2024), which states that with increasing age, the risk of heart failure increases due to structural and functional changes in the cardiovascular system, such as decreased blood vessel elasticity and myocardial function.

Based on the length of stay of heart failure patients, it shows that the majority of patients received treatment with a length of stay ≤5 days, as many as 214 patients (85.6), while patients with a length of stay >5 were 36 patients (14.4%). The short length of stay reflects the effectiveness of hospital protocols, the availability of clinical resources, and the patient's good response to treatment. Patients who have been allowed to go home are patients who do not require special monitoring. This is supported by research by Tandipanga et al. (2025) and Djaya et al. (2021), which states that the duration of hospitalization is influenced by the patient's condition, comorbidities, and health facility management.

Based on comorbidities, the highest number of heart failure patients had comorbidities other than diabetes mellitus, chronic kidney failure, and hypertension, with a percentage of 45.2% (113 patients), while patients with comorbidities of diabetes mellitus, chronic kidney failure, and hypertension were 36.8% (92 patients). These three conditions are interrelated, often found together in elderly patients, and collectively worsen heart function. This is in line with research by Maharianingsih et al. (2024) and Susanto et al. (2024), which linked these comorbidities to worse clinical outcomes in patients with CKD and heart failure. One of the factors that triggers the presence of comorbidities is old age, where the results of this study also showed that heart failure patients were most dominant at the age of 46-60 years. According to Febyolla et al. (2025) who stated that old age can also increase the risk of chronic kidney disease and can worsen heart failure. Therefore, early detection and management of comorbidities such as hypertension and diabetes mellitus are very important in the management of heart failure patients.

Based on Table 1 also shows that most heart failure patients have comorbidities ≤2, with a percentage of 64.8 (162 patients), and patients with comorbidities >2 are 13.8% (33 patients). These results indicate that the majority of heart failure patients at Hospital X, Kudus, have a relatively small number of comorbidities. This can be caused by several factors, including the effectiveness of early detection programs and chronic disease management implemented in the health facility.

b. The Compatibility of Blood Pressure with The JNC 7 Target

The compatibility of blood pressure with the JNC 7 target can be seen in Table 2.

Table 2. The Compatibility of Blood Pressure with The JNC 7 Target

Category Compatibility of Blood Pressure Target	Total	(%)
On Target (<110/85-140/90 mmHg)	162	64,8
Not on Target (>140/90 mmHg)	88	35,2
Total	**250**	**100**

Source: Primary Data (2025)

Based on Table 2, it is known that as many as 162 people (64.8%) of heart failure patients have blood pressure that is in accordance with the target, which is in the range of <110/85 - 140/90 mmHg. Meanwhile, there are 88 patients (35.2%) whose blood pressure is not under the target, which is still above 140/90 mmHg. This indicates that the use of antihypertensive agent therapy in

heart failure patients can reduce blood pressure in most patients according to JNC 7.

Blood pressure that is not under the target can be influenced by various factors, including the number and type of comorbidities that the patient has, as well as the antihypertensive therapy received (Chobanian et al., 2004). The target blood pressure in heart failure patients needs to be adjusted to the clinical condition and age of the patient. In clinical practice, achieving the target blood pressure in heart failure patients is very important to reduce the risk of cardiovascular complications and improve prognosis. However, it should be remembered that too aggressive blood pressure reduction, especially in elderly patients, can increase the risk of side effects such as hypotension and organ hypoperfusion. Therefore, adjustments to antihypertensive therapy must be carried out individually based on the patient's condition (Mardika et al., 2024). The results of this study indicate that most heart failure patients have achieved target blood pressure according to clinical guidelines, but there is still a proportion of patients who require therapy adjustments to achieve optimal blood pressure control.

c. The Correlation of Compatibility of Blood Pressure with the JNC 7 Target on the Patient's Characteristics

The test of the correlation between blood pressure compliance with JNC 7 targets and patient characteristics was carried out using a bivariate test using Spearman's rho. The test was carried out after seeing the results of the normality of the data, which were statistically significant. The results of the normality test can be seen in Table 3.

Table 3. Normalitas Test

	Kolmogorov-Smirnov[a]		
	Sig.	p.*value*	Description
Patient age	,000	<0,05	Not Normally
Patient gender	,000	<0,05	Not Normally
Types of comorbidities	,000	<0,05	Not Normally
The number of comorbidities	,000	<0,05	Not Normally
Length of stay	,000	<0,05	Not Normally
Blood Pressure Compliance	,000	<0,05	Not Normally

Source: Primary Data (2025)

Based on Table 3 it shows that the data is not normally distributed with a significance value of 0.000 <0.05, so it is continued with a non-parametric statistical test to see the correlation between blood pressure compliance with the JNC 7 target and patient characteristics. The test used is Spearman's rho test, where the test is a non-parametric correlation test used to measure the strength and direction of the correlation between two ordinal variables or numeric variables that are not normally distributed (Sugiyono, 2020). The results of the test can be seen in Table 4.

Table 4. The Correlation of Compatibility of Blood Pressure with the JNC 7 Target on the Patient's Characteristics

Patient Characteristic Variable	Compatibility of Blood Pressure with the JNC 7 Target		
	r	p-value	Description
Age	-0,166	0,009	Significant Correlation
Gender	-0,121	0,055	Significant Correlation
Types Of Comorbidities	-0,198	0,002	Significant Correlation
The Number Of Comorbidities	0,152	0,017	Significant Correlation
Length Of Stay	0,151	0,017	Significant Correlation

Source: Primary Data (2025)

Based on Table 4 shows that there is a significant negative correlation between age and blood pressure compliance (r = -0.166; p = 0.009), but when viewed from the r value, this correlation is very weak. This shows that the older the patient, the more likely their blood pressure is not under the target set by JNC 7. This negative correlation is physiologically and clinically logical because increasing age makes blood pressure control more difficult, both due to body changes and comorbidities. Therefore, the older the patient, the more likely their blood pressure is not under the JNC 7 target.

The results of the analysis on gender characteristics showed a nearly significant negative

correlation between gender and compatibility of blood pressure (r = - 0.121; p = 0.055). The negative correlation coefficient value indicates that the more likely the subject is male, the lower the blood pressure compatibility. This means that men are more at risk of experiencing high blood pressure than women. Although this correlation is very weak, its negative direction still provides important clinical meaning. One possible physiological explanation is the absence of hormonal protection from estrogen in men, which is known to have a cardioprotective effect. In addition, men's lifestyles such as being busy working, stressed, a lack of exercise, and smoking can disrupt the vascular system and result in heart failure, and then blood pressure is difficult to control.

Based on the results of the analysis of the type of comorbid disease, it shows that there is a significant negative correlation between the type of comorbid disease and blood pressure compliance (r = -0.198; p = 0.002). A negative r value indicates that the more severe or complex the type of comorbid disease (eg, a combination of diabetes, kidney failure, and hypertension), the lower the level of blood pressure compliance with the target. The strength of the correlation in these results is very weak, but these results are still important because they indicate that the presence of comorbid diseases can be an obstacle in achieving optimal blood pressure targets.

Based on the analysis of the number of comorbidities, it can be seen that there is a significant positive correlation between the number of comorbidities and blood pressure compliance (r = 0.152; p = 0.017), but when viewed from the r value, this correlation is very weak. This means that patients with more than 2 comorbidities are more likely to have blood pressure that is under the target. This is most likely because patients with a higher number of comorbidities receive more intensive attention in therapy management, including more optimal combination therapy.

A significant positive correlation was also shown from the analysis results between length of stay and blood pressure compliance (r=0.151; p=0.017), but when viewed from the r value, this correlation is very weak. These results indicate that the longer the patient is treated, the greater the likelihood that their blood pressure will be under the target set by JNC 7. This may be because longer hospitalization allows for more intensive blood pressure monitoring and periodic adjustment of drug doses.

These results are in line with previous studies showing that age, gender, and comorbidities affect blood pressure control in heart failure patients. In addition, longer hospitalization provides a greater opportunity for medical personnel to adjust therapy and monitor blood pressure intensively, thereby increasing the likelihood of achieving blood pressure targets under JNC 7 guidelines (Padmasari & Husna, 2023).

CONCLUSION

The suitability of heart failure patients with JNC 7 blood pressure targets at Hospital X, Kudus, was 162 people (64.8%) with blood pressure in the range of <110/85–140/90 mmHg. The results of statistical analysis showed that there was a correlation between patient characteristics and the suitability of heart failure patients' blood pressure with the JNC 7 target, where a very weak negative correlation was found for age (r=-0.166; p=0.009); gender (r=-0.121; p=0.055); and type of comorbidity (r=-0.198; p=0.002), while the number of comorbidities (r=0.152; p=0.017) and length of stay (r=0.151; p=0.017) had a very weak positive correlation with blood pressure suitability.

REFERENCES

Anggraini, T.D., Sari, I.P. & Probosuseno, P. (2019). Evaluasi pengaruh kesesuaian terapi hipertensi dengan guideline JNC-7 terhadap tercapainya target tekanan darah pasien di RS Panti Waluyo Surakarta periode Januari-Desember 2013, Jurnal Farmasi (Journal of Pharmacy), 5(1):25–28.

Astuti, A. D., Basuki, H. O., & Priyanto, S. (2024). Buku ajar keperawatan gerontik. Jakarta: PT Nuansa Fajar Cemerlang.

Chobanian, A., Bakris, G., Black, H., Cushman, W., Green, L., Izzo, J., Jones, D., Materson, B., Oparil, S. & Wright, J. (2004). The seventh report of the Joint National Committee on Prevention, Detection, Evaluation, and Treatment of High Blood Pressure. New York: New York State Journal of Medicine.

Djaya, K. H., Nasution, S. A., & Antono, D. (2021). Gambaran lama rawat dan profil pasien gagal jantung di

rumah sakit cipto mangunkusumo. Indonesia Journal of CHEST, 2(4):141–150.
Febtrina, R. dan Malfasari, E. (2018). Analisa nilai tanda-tanda vital pasien gagal jantung. Health Care : Jurnal Kesehatan, 7(2): 62–68.
Hasanah, D.Y., Zulkarnain, E., Arifianto, H., Sasmaya, H., Suciadi, L.P., Dewi, P.P., Soerarso, R., Nauli, S.E., Putri, V.K.P., Aditrya, W. dan Sarastri, Y. (2023). Pedomam tatalaksana penyakit gagal jantung: NBER Working Papers. Jakarta: Perhimpunan Dokter Spesialis Kardiovaskular Indonesia.
Hidayatillah, N. (2021). Evaluasi efektivitas penggunaan kombinasi obat antihipertensi pada pasien gagal jantung kongestif di rsi siti khadijah palembang tahun (2020). Sumatera.
Kemenkes RI. (2018). Laporan nasional RISKESDAS 2018. Jakarta: Badan Penelitian dan Pengembangan Kesehatan.
Kusuma, I.Y., Megasari, P.O.D. dan Sunarti. (2020). Buku saku farmakoterapi jantung. Purwokerto: UHB Press.
Mardika, D. N., Astuti, S. D., & Wijayanti, T. (2024). Analisis hubungan rasionalitas penggunaan obat antihipertensi dengan keberhasilan terapi pasien rawat inap rumah sakit X tahun 2022. Jurnal Farmasi Komunitas, 11(1):16–21.
Moreno, M.U., González, A., López, B., Ravassa, S., Beaumont, J., San José, G., Querejeta, R. dan Díez, J. (2017). Hypertensive heart disease, encyclopedia of cardiovascular research and medicine. Medical Clinics, 101(1): 43-52 Elsevier.
Padmasari, S., & Husna, N. (2023). Faktor prediktor ketercapaian target tekanan darah pasien hipertensi di rs pku muhammadiyah gamping. Pharmaceutical Journal of Indonesia, 9(1):20–25.
Rampengan, S.H. (2014). Buku praktis kardiolaogi. Jakarta: Fakultas Kedokteran Universitas Indonesia.
Rukminingsih, F. dan Susanto, T.C. (2020). Pengukuran tekanan darah pada pasien gagal jantung kongestif di instalasi rawat inap rumah sakit ST. Elisabeth Semarang. Jurnal Riset Kefarmasian Indonesia, 2(1): 10-16.
Siswanto, B.B., Hersunarti, N., Erwinanto, Barack, R., Pratikto, R.S., Nauli, S.E. & Lubis, A. (2015). Pedoman Tatalaksana Gagal Jantung. Jakarta: Perhimpunan Dokter Spesialis Kardiovaskular Indonesia. Jakarta.
Souhoka, M. S., Kailola, N. E., & Zakiah, V. (2024). Prevalensi dan karakteristik pasien gagal jantung di poliklinik jantung dan iccu rsud dr. m. haulussy ambon tahun 2023. Moluca medica, 17:113-123.
Sugiyono. (2020). Metodologi penelitian kuantitatif, kualitatif dan r&d. Bandung: Alfabeta Bandung.