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Cognitive function and related factors in patients with heart failure

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Abstract

Background: Impaired cognitive function is associated with poor outcomes, frequent hospitalization, and high mortality in HF.
Purpose: To determine the prevalence of cognitive function in HF and what factors contribute.
Method: This study was an observational analysis with cross-sectional. Study subjects: HF patients at the Cardiac Polyclinic of Dr. M. Haulussy Hospital, Ambon, Indonesia from August to September 2023, with Inclusion criteria: aged 40-65 years; able to communicate well; not having a stroke or other neurological disorders (Parkinson's disease, Alzeimer's disease, Multiple Sclerosis) or other cognitive function disorders (such as due to injury or substance abuse); can read and write. Exclusion criteria: worsening of physical condition such as loss of consciousness and worsening of symptoms such as severe shortness of breath, inability to communicate, inability to complete the questionnaire, and worsening of symptoms that do not improve after being rested when data collection is carried out.
Results: HF patients were male (56.2%), had ≥ 12 years of education (72.4%), were not actively working (56.9%), suffered from HF with NYHA class II functional status (49.1%), had Coronary Artery Disease (CAD) comorbid only (49.2%), had experienced hospitalization (64.6%), and were obese (51.54%). Respondents had an average age of 57.08 ± 6.78 years, a duration of HF of 3.96 ± 4.35 years, an average body mass index of 25.65 ± 4.5 Kg/m2, normal blood pressure with an average systole of 122.73 ± 17.21 mmHg, and an average diastole of 77.44 ± 10.11 mmHg. HF patients who experienced impaired cognitive function were 87.69% with mild cognitive impairment 73.1%, moderate cognitive impairment 13.1%, and severe cognitive impairment 1.5%. The maximum score of MoCA sub-domains of executive function was 46.2%; visuospatial 35.4%; attention 37.7%, naming and language 20%; abstraction 33.8%, delayed memory 3.8% and orientation 86.9%. There was a significant correlation between cognitive function and age (ρ = 0.000; r = -0.324), education level (ρ = 0.000; r = 0.327), and New York Heart Association functional status (ρ = 0.021; r = -202).
Conclusion: There is a high prevalence of impaired cognitive function in chronic HF patients accompanied by a global decline in cognitive function subdomains. Factors that may contribute to HF cognitive function include age, education level, not actively working, New York Heart Association functional status, comorbidities, and obesity.

Keywords: Cognition; Cognitive Function; Heart Failure.

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INTRODUCTION

Heart failure (HF) is a clinical syndrome resulting from structural or functional heart disorders that impair the ability of the ventricles to fill or expel blood (Lovell, Pham, Noamani, Davis, Johnson, & Ibrahim, 2019). Heart failure is not limited to the heart itself, but involves the entire body system, including the central nervous system. Brain-cardiac involvement is believed to be a bidirectional and multifaceted interaction (Ovsenik, Podbregar, & Fabjan, 2021; Rigueira, Agostinho, Aguiar-Ricardo, Gonçalves, Santos, Nunes-Ferreira, Rodrigues, Cunha, André, Pires, Veiga, Mendes Pedro, Pinto, & Brito, 2021).

Approximately 6.5 million adults have been diagnosed with HF in the United States (Dionne-Odom, Ejem, Wells, Azuero, Stockdill, Keebler, Sockwell, Tims, Engler, Kvale, Durant, Tucker, Burgio, Tallaj, Pamboukian, Swetz, & Bakitas, 2020). The incidence of HF in Europe is about 5 per 1000 people annually in adults. Its prevalence increases from about 1% aged <55 years to >10% in those aged 70 years or older (McDonagh, Metra, Adamo, Gardner, Baumbach, Böhm, Burri, Butler, Celutkiene, Chioncel, Cleland, Coats, Crespo-Leiro, Farmakis, Gilard, & Heymans, 2021). The prevalence of HF in Asia ranges from 1-3% of the adult population (Reyes, Ha, Firdaus, Ghazi, Chrommintikul, Sim, Vu, Siu, Yin, & Cowie, 2016). Basic Health Research (*Riskesdas*) data shows an increasing trend in heart disease from 0.5% in 2013 to 1.5% in 2018 in Indonesia (Ministry of Health of the Republic of Indonesia, 2018).

Chronic HF patients may develop acute attacks that require hospitalization at any time. Each year, HF causes more than one million hospitalizations and approximately 300,000 deaths in the United States with healthcare costs estimated to reach USD 70 billion by 2030 (McHorney, Mansukhani, Anatchkova, Taylor, Wirtz, Abbasi, Battle, Desai, & Globe, 2021). In addition to hospitalization, HF also causes patients to die as much as 22% within the first year of hospitalization and almost 50% will die within 5 years even though treatment in developed countries has experienced many advances (Dionne-Odom et al., 2020). In Indonesia, heart disease is the biggest cost burden. Social Security Organizing Agency of Health data in 2021 shows that the largest health financing is in heart disease amounting to IDR 7.7 trillion (Ministry of Health of the Republic of Indonesia, 2022).

Impaired heart function can affect the brain causing cognitive impairment, anxiety, and depression, which in turn can contribute to further worsening of HF (Rigueira et al., 2021). Impaired cognitive function in HF has a very high prevalence of 25%-75% (Lee, Qian, Liu, Graham, Mann, Nakanishi, Teerlink, Lip, Freudenberger, Sacco, Mohr, Labovitz, Ponikowski, Lok, Matsumoto, Estol, Anker, Pullicino, Buchsbaum, & Di Tullio, 2019; Rigueira et al., 2021). Studies in Indonesia found that the prevalence of cognitive function impairment in HF tends to be higher than globally, namely 50.7%-95% (Arifin & Fitri, 2021; Birowo, Lastri, Makmun, & Prihartono, 2010; Saputra, Adnyana, Laksmidewi, Gelgel, & Widyadharma, 2020). Impaired cognitive function is known to reduce the ability of HF patients to carry out self-management (Kalogeropoulos & Skopicki, 2019; Pons, Jansen, & Hemels, 2021), reduce health outcomes, and increase mortality (Lovell et al., 2019).

One of the factors that have an impact on HF is cognitive function factors because previous studies have shown that impaired cognitive function is associated with poor outcomes, frequent hospitalizations, and high mortality rates in HF (Gallagher, Sullivan, Burke, Hales, Sharpe, & Tofler, 2016; Kim, Hwang, Heo, Shin, & Kim, 2019). However, health workers who routinely check cognitive function in HF patients are still rare (Yang, Sun, Wang, Yan, Zheng, & Ren, 2022). By knowing the cognitive function status in HF, patient caregivers can provide more appropriate therapy or intervention. Given the high prevalence of cognitive function in HF, researchers want to determine the prevalence of cognitive function in HF and what factors contribute.

RESEARCH METHOD

This research is an observational analysis with a cross-sectional design where each subject is only observed once and measurements of subject variables are also carried out during the examination (Sastroasmoro, 2011). The population in this study were HF patients at the Cardiac Polyclinic of Dr. M. Haulussy Hospital from August to September 2023, sampling was carried out using non-probability

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samples in the form of consecutive samples. With inclusion criteria: age 40-65 years; able to communicate well; have not had a stroke or other neurological disorders (Parkinson's disease, Alzheimer's disease, Multiple Sclerosis) or other cognitive dysfunction (such as due to injury or substance abuse); can read and write. Exclusion criteria: worsening of physical condition such as loss of consciousness and worsening of symptoms such as severe shortness of breath, inability to communicate, inability to complete the questionnaire, and worsening of symptoms that do not improve after being rested when data collection is carried out.

The number of samples in this study was calculated using the G Power For Windows 3.1.9.7 application (Faul, Buchner, Erdfelder, & Mayr, 2007). with input according to the hypothesis using two tails; R2 or ρ: 0.33 (adjust) obtained from previous research (Erceg, Despotovic, Milosevic, Soldatovic, Zdravkovic, Tomic, Markovic, Mihajlovic, Brajovic, Bojovic, Potic, & Davidovic, 2013) with a value of α: 0.01 (determined by the researcher), power (1-β): 0.90 (determined by the researcher). So the minimum sample size in this study was 129 respondents and rounded up to 130.

Data collection instruments in the form of demographic questionnaires include age, gender, education level, duration of HF, Body Mass Index (BMI), blood pressure taken from primary data and functional degree of HF according to NYHA, hospitalization due to HF, comorbidities such as Diabetes Mellitus, hypertension, coronary artery disease taken from secondary data. Cognitive function screening instrument in the form of Montreal Cognitive Assessment-Version Indonesia (MoCA-Ina) with a total score of 30, classified into 26-30 with no cognitive impairment, 18-25 with mild cognitive impairment, 10-17 moderate cognitive impairment, and less than 10 severe cognitive impairment. The Montreal Cognitive Assessment (MoCA) can assess cognitive function with domains of attention/concentration, executive function, memory, language, visuoconstructional ability, abstract thinking, and orientation (Nasreddine, Phillips, Bédirian, Charbonneau, Whitehead, Collin, & Chertkow, 2005). Data processing uses a computer software program.

Data analysis using computer software programs is presented as frequency distribution tables tendency measures, or graphs (Sastroasmoro, 2011). On demographic data and overall cognitive function, univariate description analysis to see the characteristics of respondents and presented in the form of frequency, percentage, and mean. Cognitive function data was categorized with a score of 26-30 with no cognitive impairment, 18-25 with mild cognitive impairment, 10-17 with moderate cognitive impairment, and <10 with severe cognitive impairment.

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RESEARCH RESULTS

Table 1. Characteristic of Respondents (N=130)

Variable	Results	Cognitive Impairment
Age (Mean ±SD)(Range)(Years)	(57.08±6.78) (40-65)	
Gender (n/%)		
Male	73/56.2	65/57
Female	57/43.8	49/43
Education (n/%)		
Elementary School	36/27.6	33/28.9
High School	94/72.4	81/71.1
Occupation (n/%)		
Public Servant/Military	20/15.4	15/13.2
Employee	36/27.7	28/24.5
Unemployment	74/56.9	71/62.3
Duration of Heart Failure (Mean ±SD)(Range)(Years)	(3.96±4.35) (0.5-23)	
Body Mass Index (n/%)		
(Mean ±SD) (Range)(Years)	(25.65±4.5) (15.04-37.46)	
Thin	8/6.2	7/6.1
Normal	29/22.3	26/22.8
Overweight	25/19.2	22/19.3
Obese I	47/36.2	42/36.9
Obese II	21/16.1	17//14.9
NYHA Functional Status (n/%)		
Class I	58/44.6	49/43
Class II	64/49.2	59/51.7
Class III	8/6.2	6/5.3
Comorbid (n/%)		
Coronary Artery Disease	62/47.7	52/45.6
Diabetes Mellitus	15/11.5	15/13.2
Hypertension	27/20.8	25/21.9
Other (Congenital Heart Disease, Atrial Fibrillation, Chronic Renal Failure, Cardiomyopathies, Valvular Heart Disease)	26/20	22/19.3
History of Hospitalization Due to Heart Failure (n/%)		
Ever	84/64.6	73/64
Never	46/35.4	41/36
Blood Pressure (Mean ±SD) (Range) (mmHg)		
Systolic	(122.73±17.21) (80-180)	
Diastolic	(77.44±10.11) (52-100)	
Cognitive Function (n/%)		
Normal	16/12.3	
Mild Impairment	95/73.1	
Moderate Impairment	17/13.1	
Severe Impairment	2/1.5	

Abbreviation: NYHA=New York Heart Association

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Table 1 above shows HF patients who are outpatients at Dr. M. Haulussy Hospital, majority male (56.2%), educated ≥ 12 years (72.4%), not actively working (56.9%), suffering from heart failure with NYHA class II functional status (49.2%), only has comorbidities Coronary Artery Disease (CAD) (47.7%), had been hospitalized (64.6%), and were obese (52.3%). Respondents had an average age of 57.08 ± 6.78 years, duration of suffering from heart failure 3.96 ± 4.35 years, average body mass index 25.65 ± 4.5 kg/m2, average blood pressure normal with systolic 122.73 ± 17.21 mmHg, and diastolic 77.44 ± 10.11 mmHg.

The percentage of cognitive impairment in men is approximately the same as in women. Respondents with < 12 years of education had a higher percentage of cognitive impairment compared to those with ≥ 12 years of education. Not actively working has the highest percentage of cognitive impairment compared to other jobs. NYHA class II functional status indicated the most cognitive impairment. Comorbid cognitive disorders vary with the highest percentage being diabetes and hypertension. For history of hospitalization due to HF status and BMI, the percentage of cognitive impairment for each category was similar.

HF patients who experienced impaired cognitive function amounted to 87.7%, namely 73.1% mild cognitive impairment, 13.1% moderate cognitive impairment, and 1.5% severe cognitive impairment.

Table 2. Results Assessment Score of Cognitive Function and Cognitive Function Sub-domains (N = 130)

Domain		Mean	SD	% Score
Total Cognitive Function Score (MoCA)		21.14	4.09	87.7
Sub Domain	**Maximal Score**			**% Max Score**
Executive function	1	0.46	0.5	46.2
Visuospatial	4	2.93	1.05	35.4
Attention	6	4.52	1.44	37.7
Naming & Language	6	4.48	1.2	20
Abstract	2	0.95	0.85	33.8
Delayed Memory	5	1.68	1.47	3.8
Orientation	6	5.82	0.52	86.9

Abbreviation: MoCA = Montreal Cognitive Assessment

Table 2 shows that the maximum score of MoCA sub-domains from respondents are executive function at 46.2%; visuospatial at 35.4%; attention at 37.7%, naming and language at 20%; abstraction at 33.8%, delayed memory at 3.8% and orientation at 86.9%.

Table 3. Results of Bivariate Analysis related factors with Cognitive Function*

Variable	Cognitive Function
Age	ρ = 0,000; r = -0,324
Sex	ρ = 0,626; r = -0,043
Education Level	ρ = 0,000; r = 0,327
Duration of HF	ρ = 0,360; r = 0,081
NYHA Functional Status	ρ = 0,021; r = -202
History of Hospitalization due to HF	ρ = 0,155; r = -0.125
Body Mass Index	ρ = 0,453; r = 0.066

*Spearmen Correlation

Table 3 shows a significant negative correlation between cognitive function, age, and NYHA functional status. This means that the older the age and higher NYHA status, the more cognitive function decreases. There is a significant positive correlation between education level and cognitive function. This means that the higher the education, the higher the cognitive function.

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DISCUSSION

This study found that most respondents tended to experience impaired cognitive function with an average score of 21.14 ± 4.09 (87.7%). This is in line with studies in Indonesia which found that impaired cognitive function in HF ranged from 50.7%-95% (Arifin & Fitri, 2021; Birowo et al., 2010; Saputra et al., 2020). This number is greater than the global rate which ranges from 25%-75% (Lee et al., 2019; Rigueira et al., 2021).

This study showed that cognitive impairment in men and women was similar and the relationship was not significant between gender and cognitive function. Different results were shown in research in Korea which stated that elderly women with HF had higher cognitive impairment than men (Lee & Son, 2018). This is because in women there is an increase in cardiovascular risk factors such as estrogen/androgen hormone imbalance; systemic inflammation; microvascular/vasospastic disease; and increased risk of atrial fibrillation which leads to impaired cognitive function (Volgman, Bairey Merz, Aggarwal, Bittner, Bunch, Gorelick, Maki, Patel, Poppas, Ruskin, Russo, Waldstein, Wenger, Yaffe, & Pepine, 2019).

Respondents in this study tended to be older (>50 years), more had NYHA class II and above than NYHA class I, education level ≥12 years and there was a significant relationship with cognitive function. Research in Singapore found that age, education level, coronary artery disease which causes heart failure, and cardiovascular risk were associated with cognitive function (Dong, Teo, Kang, Tan, Ling, Yeo, Sim, Jaufeerally, Leong, Ong, Soon, Lee, Loh, Tan, Chan, Richards, & Lam, 2019). Previous research found that cognitive decline was associated with increasing age in HF patients (Lee et al., 2019). Older people will experience a gradual decline in cognitive function over time. Decreased ventricular systolic in systolic HF can lead to decreased cognitive function. Cerebral hypoperfusion occurs due to reduced delivery of glucose, an energy substrate to the brain so that it can damage or destroy neurons causing impaired cognitive function. This explains why it is common to find severe cognitive impairment in NYHA class IV rather than NYHA class II (Ampadu & Morley, 2015). Lack of education affects the decline of cognitive function (Lee et al., 2019). The higher the level of education, the easier it is to capture information and have better cognitive so that it can more easily recognize the symptoms of the disease, try to find treatment to overcome the HF suffered, and choose and decide on the best treatment for the disease (Purnamawati, Arofiati, & Relawati, 2018).

Respondents were mostly people who were not actively working with a composition of mostly housewives and retirees. this study shows people who are not actively working have high cognitive impairment compared to those who are actively working. Previous research suggests that unemployed middle-aged women experience worse cognitive impacts (Madhavan, Bajaj, Dasson Bajaj, & D'Souza, 2022). And people who have paid work, have a positive impact on cognitive abilities. People who work will require themselves to learn new skills, perform routine activities, and interact socially. this directly or indirectly maintains the health of cognitive function. people who no longer work will lose the cognitive stimulation provided while working and can experience impaired cognitive function (Vance, Bail, Enah, Palmer, & Hoenig, 2016).

Comorbidities impact the clinical manifestations and outcomes of HF patients. HF comorbidities include coronary artery disease, hypertension, atrial fibrillation, valvular heart disease, ventricular arrhythmias, diabetes mellitus, stroke, chronic obstructive pulmonary disease, thyroid disease, cancer, sarcopenia, anemia (Correale, Paolillo, Mercurio, Ruocco, Tocchetti, & Palazzuoli, 2021). The results of this study found HF comorbidities including coronary heart disease, hypertension, atrial fibrillation, valvular heart disease, dilated cardiomyopathy, diabetes mellitus, chronic kidney disease, and congenital heart disease. The most common comorbidity was coronary artery disease. Coronary blood vessels are responsible for supplying blood to the myocardium. The presence of coronary artery disease such as narrowing or blockage will cause damage to myocardial tissue, causing HF (Severino, D'Amato, Pucci, Infusino, Birtolo, Mariani, & Fedele, 2020).

The impact of comorbid coronary artery disease, hypertension, and diabetes mellitus on cognitive function is that it can cause microangiopathy and minor infarcts in the brain. coronary artery disease causes heart failure which reduces the supply of

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oxygen and nutrients to the brain, resulting in cognitive impairment. Diabetes causes an increase in cortisol and inflammation which negatively affects the brain (Vance, Larsen, Eagerton, & Wright, 2011).

More than half of the subjects in this study had experienced hospitalization (64.6%) but cognitive impairment similes with unexperienced hospitalization and correlation with cognitive function were not significant. Research on patients aged 65 and older suggests there is a relationship between hospitalization and a decline in cognitive function (Mathews, Arnold, & Epperson, 2014). Patients treated in non-elective hospitals experience a more dramatic decline in cognitive function compared to elective hospitalizations (James, Wilson, Capuano, Boyle, Shah, Lamar, Ely, Bennett, & Schneider, 2019). Factors Possible causes related to decreased cognitive function include delirium, drugs, stress, and depression (Mathews et al., 2014).

The mean body mass index in this study showed grade 1 obesity with similar cognitive function impairment at all levels of thin, normal, overweight, grade 1 obesity, and grade 2 obesity although no significant association was found with cognitive function. Obesity along with comorbidities such as hypertension and diabetes are associated with decreased cognitive function and neurodegenerative disorders such as dementia (Dye, Boyle, Champ, & Lawton, 2017). Pathological mechanisms in the form of obesity cause excess body fat, especially in visceral tissue, which in turn is prone to inflammation that causes vascular and metabolic changes and the release of free fatty acids that can damage the nervous system (Devere, 2018; Nguyen, Killcross, & Jenkins, 2014).

In HF patients there is a comprehensive cognitive decline with multiple cognitive domain deficits including executive function, psychomotor speed, visuospatial ability, and memory. And decreased cognitive function is related to the severity of HF (Goh, Kong, Wong, Chong, Chew, Yeo, Sharma, Poh, & Sia, 2022). In this study, more than half of the cognitive function domains had deficits including executive function (53.8%), visuospatial ability (64.6%), attention (62.3%), language (80%), abstraction (66.2%), and memory (96.2%).

More than half of respondents experienced mild cognitive impairment (73.1%). Previous research suggests where most respondents (61.32%) experienced mild cognitive impairment. In the maximum score of the MoCA subdomain, it was found that most respondents did not reach 50% except for the orientation subdomain. Even the delayed memory subdomain was the smallest maximum score achieved by respondents (Vellone, Chialà, Boyne, Klompstra, Evangelista, Back, Ben Gal, Mårtensson, Strömberg, & Jaarsma, 2020). Different results were found among older hospitalized patients with acute decompensated heart failure, with all subdomain maximum scores of more than 50% except the delayed memory subdomain (Pastva, Hugenschmidt, Kitzman, Nelson, Brenes, Reeves, Mentz, Whellan, Chen, & Duncan, 2021).

Patients with impaired cognitive function will experience impairment in the subdomains of cognitive function either globally or partially. The domain of poor attention and concentration may distract from performing certain tasks while impaired prospective memory may have a detrimental impact on engagement in self-care behaviors such as picking up prescriptions from pharmacists, attending clinical meetings, medication adherence, and daily weighing which are all important in HF self-management (Lovell et al., 2019).

The executive function domain is important as it is associated with decision-making, poor self-monitoring, poor organization, and planning, and also affects learning and efficiency of recall. Impairments in these domains critically affect the need for HF patients to be able to adapt to complex treatment regimens and lifestyles, to recognize and respond to worsening symptoms (e.g. fluid overload, shortness of breath), how to communicate and seek timely help, disease insight (e.g. not smoking) and the ability to perform some daily self-management tasks. Therefore, executive function deficits are associated with a lack of awareness of worsening symptoms and timely decisions that ultimately lead to poorer outcomes, including relapse and hospitalization (Lovell et al., 2019).

Decreased domain of language function are associated with low literacy, inability to express concerns about disease states, and, poor understanding of health workers' instructions and advice. These, along with decreased executive function may also contribute to poorer treatment and lifestyle. Decreased psychomotor speed can result in

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flexibility in changing activities and slowed responses to visual stimuli. These skills are important in learning and performing some daily self-care tasks (Lovell et al., 2019)

CONCLUSION

There is a high prevalence of impaired cognitive function in chronic HF patients accompanied by a global decline in cognitive function subdomains. Factors that may contribute to HF cognitive function include age, education level, not actively working, New York Heart Association functional status, comorbidities, and obesity.

REFERENCES

Ampadu, J., & Morley, J. E. (2015). Heart failure and cognitive dysfunction. International Journal of Cardiology, 178, 12–23. https://doi.org/10.1016/j.ijcard.2014.10.087

Arifin, H., & Fitri, F. I. (2021). Hubungan Indeks Aterogenik Plasma dan Fraksi Ejeksi dengan Fungsi Kognitif pada Pasien Lanjut Usia dengan Gagal Jantung. Repositori Institusi Universitas Sumatera Utara (RI-USU). http://repositori.usu.ac.id/handle/123456789/38021

Birowo, H., Lastri, D. N., Makmun, L. H., & Prihartono, J. (2010). Gangguan kognitif pada pasien gagal jantung kongestif dan faktor-faktor yang mempengaruhinya. Neurona. https://scholar.ui.ac.id/en/publications/gangguan-kognitif-pada-pasien-gagal-jantung-kongestif-dan-faktorf

Correale, M., Paolillo, S., Mercurio, V., Ruocco, G., Tocchetti, C. G., & Palazzuoli, A. (2021). Non-cardiovascular comorbidities in heart failure patients and their impact on prognosis. Polish Heart Journal (Kardiologia Polska), 79(5), 493-502.

Devere, R. (2018). The Cognitive Consequences of Obesity. Practical Neurology, April, 22–25.

Dionne-Odom, J. N., Ejem, D. B., Wells, R., Azuero, A., Stockdill, M. L., Keebler, K., Sockwell, E., Tims, S., Engler, S., Kvale, E., Durant, R. W., Tucker, R. O., Burgio, K. L., Tallaj, J., Pamboukian, S. V., Swetz, K. M., & Bakitas, M. A. (2020). Effects of a Telehealth Early Palliative Care Intervention for Family Caregivers of Persons With Advanced Heart Failure: The ENABLE CHF-PC Randomized Clinical Trial. JAMA Network Open, 3(4), e202583. https://doi.org/10.1001/jamanetworkopen.2020.2583

Dong, Y. H., Teo, S. Y., Kang, K., Tan, M., Ling, L. H., Yeo, P. S. D., Sim, D., Jaufeerally, F., Leong, K. T. G., Ong, H. Y., Soon, D., Lee, S., Loh, S. Y., Tan, R. S., Chan, S. P., Richards, A. M., & Lam, C. S. P. (2019). Cognitive impairment in Asian patients with heart failure: prevalence, biomarkers, clinical correlates, and outcomes. European Journal of Heart Failure, 21(5), 688–690. https://doi.org/10.1002/ejhf.1442

Dye, L., Boyle, N. B., Champ, C., & Lawton, C. (2017). The relationship between obesity and cognitive health and decline. Proceedings of the Nutrition Society, 76(4), 443–454. https://doi.org/10.1017/S0029665117002014

Erceg, P., Despotovic, N., Milosevic, D. P., Soldatovic, I., Zdravkovic, S., Tomic, S., Markovic, I., Mihajlovic, G., Brajovic, M. D., Bojovic, O., Potic, B., & Davidovic, M. (2013). Health-related quality of life in elderly patients hospitalized with chronic heart failure. Clinical Interventions in Aging, 8, 1539–1546. https://doi.org/10.2147/CIA.S53305

Faul, F., Buchner, A., Erdfelder, E., & Mayr, S. (2007). A short tutorial of GPower. Tutorials in Quantitative Methods for Psychology, 3(2), 51–59.

Gallagher, R., Sullivan, A., Burke, R., Hales, S., Sharpe, P., & Tofler, G. (2016). Quality of life, social support and cognitive impairment in heart failure patients without diagnosed dementia. International Journal of Nursing Practice, 22(2), 179–188. https://doi.org/10.1111/ijn.12402

Goh, F. Q., Kong, W. K. F., Wong, R. C. C., Chong, Y. F., Chew, N. W. S., Yeo, T. C., Sharma, V. K., Poh, K. K., & Sia, C. H. (2022). Cognitive Impairment in Heart Failure—A Review. Biology, 11(2), 1–15. https://doi.org/10.3390/biology11020179

James, B. D., Wilson, R. S., Capuano, A. W., Boyle, P. A., Shah, R. C., Lamar, M., Ely, E. W., Bennett, D. A., & Schneider, J. A. (2019). Cognitive decline after elective and nonelective hospitalizations in

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Corresponding author: *E-mail: astuti21001@mail.unpad.ac.id

DOI: https://doi.org/10.33024/minh.v7i1.216

older adults. Neurology, 92(7), E690–E699. https://doi.org/10.1212/WNL.0000000000006918

Kalogeropoulos, A. P., & Skopicki, H. (2019). Cognitive Decline in Heart Failure: The Silent Enemy. JACC: Heart Failure, 7(12), 1054–1055. https://doi.org/10.1016/j.jchf.2019.10.001

Kim, J. S., Hwang, S. Y., Heo, S., Shin, M. S., & Kim, S. H. (2019). Predicted relationships between cognitive function, depressive symptoms, self-care adequacy, and health-related quality of life and major events among patients with heart failure. European Journal of Cardiovascular Nursing, 18(5), 418–426. https://doi.org/10.1177/1474515119840877

Lee, J. K., & Son, Y. J. (2018). Gender differences in the impact of cognitive function on health literacy among older adults with heart failure. International Journal of Environmental Research and Public Health, 15(12). https://doi.org/10.3390/ijerph15122711

Lee, T. C., Qian, M., Liu, Y., Graham, S., Mann, D. L., Nakanishi, K., Teerlink, J. R., Lip, G. Y. H., Freudenberger, R. S., Sacco, R. L., Mohr, J. P., Labovitz, A. J., Ponikowski, P., Lok, D. J., Matsumoto, K., Estol, C., Anker, S. D., Pullicino, P. M., Buchsbaum, R., & Di Tullio, M. R. (2019). Cognitive decline over time in patients with systolic heart failure: Insights from WARCEF. JACC: Heart Failure, 7(12), 1042–1053. https://doi.org/10.1016/j.jchf.2019.09.003

Lovell, J., Pham, T., Noaman, S. Q., Davis, M. C., Johnson, M., & Ibrahim, J. E. (2019). Self-management of heart failure in dementia and cognitive impairment: a systematic review. BMC cardiovascular disorders, 19, 1-18. https://doi.org/10.1186/s12872-019-1077-4

Madhavan, A., Bajaj, G., Dasson Bajaj, P., & D'Souza, D. F. (2022). Cognitive abilities among employed and unemployed middle-aged women – A systematic review. Clinical Epidemiology and Global Health, 15, 101042. https://doi.org/https://doi.org/10.1016/j.cegh.2022.101042

Mathews, S. B., Arnold, S. E., & Epperson, C. N. (2014). Hospitalization and cognitive decline: Can the nature of the relationship be deciphered? American Journal of Geriatric Psychiatry, 22(5), 465–480. https://doi.org/10.1016/j.jagp.2012.08.012

McDonagh, T. A., Metra, M., Adamo, M., Gardner, R. S., Baumbach, A., Böhm, M., Burri, H., Butler, J., Celutkiene, J., Chioncel, O., Cleland, J. G. F., Coats, A. J. S., Crespo-Leiro, M. G., Farmakis, D., Gilard, M., & Heymans, S. (2021). 2021 ESC Guidelines for the diagnosis and treatment of acute and chronic heart failure. European Heart Journal, 42(36), 3599–3726. https://doi.org/10.1093/eurheartj/ehab368

McHorney, C. A., Mansukhani, S. G., Anatchkova, M., Taylor, N., Wirtz, H. S., Abbasi, S., Battle, L., Desai, N. R., & Globe, G. (2021). The impact of heart failure on patients and caregivers: A qualitative study. PLoS ONE, 16(3 March), 1–19. https://doi.org/10.1371/journal.pone.0248240

Ministry of Health of the Republic of Indonesia. (2018). Riset Kesehatan Dasar (Riskesdas) 2018. Retrieved from: https://labmandat.litbang.kemkes.go.xn--id426-rkd-201822-bz6i

Ministry of Health of the Republic of Indonesia. (2022). Penyakit Jantung Penyebab Utama Kematian, Kemenkes Perkuat Layanan Primer. Retrieved from: https://www.kemkes.go.id/article/view/22092900001/penyakit-jantung-penyebab-utama-kematian-kemenkes-perkuat-layanan-primer.html

Nasreddine, Z. S., Phillips, N. A., Bédirian, V., Charbonneau, S., Whitehead, V., Collin, I., & Chertkow, H. (2005). The Montreal Cognitive Assessment, MoCA: a brief screening tool for mild cognitive impairment. Journal of the American Geriatrics Society, 53(4), 695-699.

Nguyen, J. C. D., Killcross, A. S., & Jenkins, T. A. (2014). Obesity and cognitive decline : role of inflammation and vascular changes MILD COGNITIVE IMPAIRMENT. 8(November), 1–9. https://doi.org/10.3389/fnins.2014.00375

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Ovsenik, A., Podbregar, M., & Fabjan, A. (2021). Cerebral blood flow impairment and cognitive decline in heart failure. Brain and Behavior, 11(6), 1–10. https://doi.org/10.1002/brb3.2176

Pastva, A. M., Hugenschmidt, C. E., Kitzman, D. W., Nelson, M. B., Brenes, G. A., Reeves, G. R., Mentz, R. J., Whellan, D. J., Chen, H., & Duncan, P. W. (2021). Cognition, Physical Function, and Quality of Life in Older Patients With Acute Decompensated Heart Failure. Journal of Cardiac Failure, 27(3), 286–294. https://doi.org/10.1016/j.cardfail.2020.09.007

Pons, D., Jansen, R. W. M. M., & Hemels, M. E. W. (2021). Cognitive impairment and depression in heart failure: 'cardiological giants.' Netherlands Heart Journal, 29(7–8), 365–367. https://doi.org/10.1007/s12471-021-01595-2

Purnamawati, D., Arofiati, F., & Relawati, A. (2018). Pengaruh Supportive-Educative System terhadap Kualitas Hidup pada Pasien Gagal Jantung. Mutiara Medika: Jurnal Kedokteran Dan Kesehatan, 18(2). https://doi.org/10.18196/mm.180213

Reyes, E. B., Ha, J. W., Firdaus, I., Ghazi, A. M., Phrommintikul, A., Sim, D., Vu, Q. N., Siu, C. W., Yin, W. H., & Cowie, M. R. (2016). Heart failure across Asia: Same healthcare burden but differences in organization of care. International Journal of Cardiology, 223, 163–167. https://doi.org/10.1016/j.ijcard.2016.07.256

Rigueira, J., R. Agostinho, J., Aguiar-Ricardo, I., Gonçalves, I., Santos, R., Nunes-Ferreira, A., Rodrigues, T., Cunha, N., André, N., Pires, R., Veiga, F., Mendes Pedro, M., Pinto, F. J., & Brito, D. (2021). Heart and brain interactions in heart failure: Cognition, depression, anxiety, and related outcomes. Revista Portuguesa de Cardiologia (English Edition), 40(8), 547–555. https://doi.org/10.1016/j.repce.2020.09.008

Saputra, R. I., Adnyana, I. M. O., Laksmidewi, A. P., Gelgel, A. M., & Widyadharma, I. P. E. (2020). Penurunan Fraksi Ejeksi Ventrikel Kiri dalam Enam Bulan Meningkatkan Faktor Resiko Gangguan Kognitif Penderita Gagal Jantung Sistolik. Jurnal Kesehatan Andalas, 9(1), 94. https://doi.org/10.25077/jka.v9i1.1278

Sastroasmoro, I. (2011). Dasar-dasar Metodologi Penelitian Klinis (4th ed.). Sagung Seto.

Severino, P., D'Amato, A., Pucci, M., Infusino, F., Birtolo, L. I., Mariani, M. V., & Fedele, F. (2020). Ischemic heart disease and heart failure: role of coronary ion channels. International journal of molecular sciences, 21(9), 3167.

Vance, D. E., Bail, J., Enah, C., Palmer, J., & Hoenig, A. (2016). The impact of employment on cognition and cognitive reserve: implications across diseases and aging. Nursing: Research and Reviews, Volume 6, 61–71. https://doi.org/10.2147/nrr.s115625

Vance, D., Larsen, K. I., Eagerton, G., & Wright, M. A. (2011). Comorbidities and cognitive functioning: Implications for nursing research and practice. Journal of Neuroscience Nursing, 43(4), 215–224. https://doi.org/10.1097/JNN.0b013e3182212a04

Vellone, E., Chialà, O., Boyne, J., Klompstra, L., Evangelista, L. S., Back, M., Ben Gal, T., Mårtensson, J., Strömberg, A., & Jaarsma, T. (2020). Cognitive impairment in patients with heart failure: an international study. ESC Heart Failure, 7(1), 46–53. https://doi.org/10.1002/ehf2.12542

Volgman, A. S., Bairey Merz, C. N., Aggarwal, N. T., Bittner, V., Bunch, T. J., Gorelick, P. B., Maki, P., Patel, H. N., Poppas, A., Ruskin, J., Russo, A. M., Waldstein, S. R., Wenger, N. K., Yaffe, K., & Pepine, C. J. (2019). Sex Differences in Cardiovascular Disease and Cognitive Impairment: Another Health Disparity for Women? Journal of the American Heart Association, 8(19), 1–12. https://doi.org/10.1161/JAHA.119.013154

Yang, M., Sun, D., Wang, Y., Yan, M., Zheng, J., & Ren, J. (2022). Cognitive Impairment in Heart Failure: Landscape, Challenges, and Future Directions. Frontiers in Cardiovascular Medicine, 8(February). https://doi.org/10.3389/fcvm.2021.831734

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