

ORIGINAL ARTICLE

Self-Care Behaviors in Heart Failure Patients: Impact on Cardiovascular Health Profile

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ABSTRACT

Introduction: Heart failure is a complex syndrome characterized by shortness of breath, fatigue, and fluid retention signs. Self-care is the critical success of heart failure management. The cardiovascular health profile is a direct indicator of successful self-care. **Objectives:** This study examines the relationship between self-care and the cardiovascular health profile, including smoking status, body mass index, total cholesterol, blood pressure, and blood glucose level. **Methods:** This study is a cross-sectional study concerning patients with health failure at PKU Muhammadiyah hospital of Yogyakarta. It was conducted on August - October 2020, involving samples of 100 participants. A Chi-square test was used to test the relationship between the two variables. **Results:** The finding showed that self-care management has the highest self-care level (96.2%) and self-care confidence has the lowest percentage of adequate self-care (13.0%). Among five cardiovascular health profiles, smoking status is the highest metric with an ideal percentage of 95.0%, and the lowest percentage is the blood glucose metric with 14.0%. Correlation test between self-care and the total cardiovascular health profile showed no significant relationship between the two variables. However, self-care maintenance showed a significant relationship with total cholesterol levels with a value of $p = 0.008$. **Conclusions:** Promoting self-care is necessary to help patients with heart failure manage their condition and improve their ideal cardiovascular health outcome.

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1. Introduction

Heart failure is a complex syndrome with typical shortness of breath, fatigue, and fluid retention signs (PERKI, 2015). It is due to the heart muscle's weakness causing the heart unable to pump blood optimally throughout the body (Yancy et al., 2013). Heart failure is a contributor to high mortality and morbidity rates in which the number of sufferers reaching nearly 2.6 million worldwide (Savarese & Lund, 2017). The prevalence of heart failure increases over time. An estimated 6.2 million adults in America got heart failure between 2013 and 2016 (Virani et al., 2020). In Southeast Asia, the prevalence of heart failure is higher than in other parts of the world (Lam, 2015). In Indonesia, the estimated number of people with heart failure in 2013 reached more than half a million people (Kemenkes RI, 2014) with a mortality rate of 6% -12% (Siswanto et al., 2010).

Self-care is the key to the success of heart failure management (Yancy et al., 2013). Self-care is a process to maintain health, covering health care measures, early detection of symptoms, and disease management (Riegel et al., 2015). Previous studies showed that the percentage of patients with heart failure who have good self-care behavior is below 50% (Chaidir et al., 2017; Prihatiningsih & Sudyasih, 2018). Good self-care has been proven to improve the quality of life (Vellone et al., 2015), reduce symptom recurrence (Shao et al., 2013) and the number of visits to

the emergency room (IGD), re-hospitalization, and mortality in patients with heart failure (Lee et al., 2018)

The cardiovascular health profile covers seven metrics (smoking status, Body Mass Index (BMI), physical activity, dietary habits, total cholesterol levels, fasting blood glucose level, and blood pressure) as direct indicators of the success of self-care (Sanchez, 2018). Several studies suggest that a low cardiovascular health profile causes a high mortality rate in patients with heart failure (Dunlay et al., 2019; Ford et al., 2012; Upadhyaya et al., 2017). Previous research showed that the outcome of self-care that has been widely studied is the mortality rate (Lee et al., 2018; Vidán et al., 2019), visits to the emergency room, hospitalization (Lee et al., 2018), and quality of life (Lee et al., 2018). This study is the first published study concerning the relationship between self-care behavior and cardiovascular profile. This current study analyzes the relationship between self-care behavior and cardiovascular health profile in h patients with heart failure at PKU Muhammadiyah Yogyakarta Hospital.

2. Methods

This cross-sectional study was conducted in August - October 2020 at PKU Muhammadiyah Yogyakarta Hospital's heart clinic. The research protocol was declared ethical by the Health Research Ethics Commission of 'Aisyiyah Yogyakarta University No 1327 / KEP-UNISA/VI/2020. The sample involved 100 patients aged ≥ 20 years who had been diagnosed with heart failure for at least one month.

This study used questionnaires and cardiovascular health profile measurement tools in the form of a digital scale to measure body weight, a microtoise to measure height, a digital sphygmomanometer to measure blood pressure, and an automatic glucose, cholesterol, uric acid (GCU) check tool to measure total cholesterol and random blood glucose level. The measurement results were then grouped into poor, intermediate, and ideal (Sanchez, 2018). Detailed definitions of the five metrics used in the study can be seen in Table 1. The grouping of the total cardiovascular profile results was based on the previous studies (Saleem et al., 2014) in which "poor" for 0-2 ideal metrics, "intermediate" for three ideal metrics, and "ideal" for \geq four ideal metrics.

Table 1 Definition of metric of the cardiovascular health profile

Metrics	Poor	Intermediate	Ideal
Smoking	Yes	No smoking \leq 12 months	Never or stop smoking > 12 months
Body Mass Index (BMI) (kg/m ²)	≥ 30	25-29,9	< 25
Total cholesterol (mg/dL)	≥ 240	200-239 or under treatment	< 200
Blood pressure (mmHg)	Systolic blood pressure ≥ 140 or diastolic blood pressure ≥ 90	Systolic blood pressure 120-139 or diastolic blood pressure 80-89 or under treatment	< 120/<80
Random blood glucose (mg/dL)	≥ 200	100-199 or under treatment	< 100

The questionnaire consisted of 3 parts: sociodemographic characteristics, clinical characteristics, and self-care. Self-Care Heart Failure Index (SCHFI) questionnaire (Riegel et al., 2009) was used to measure participants' self-care. This instrument's validity and reliability have been tested in the previous study (Prihatiningsih & Sudyasih, 2018). The SCHFI questionnaire consists of 22 questions covering three dimensions: self-care maintenance, self-care management, and self-care confidence. Each dimension's total score was then transformed into a score range of 0-100, in which a higher score indicating better self-care. The total score of ≥ 70 was defined as adequate and <70 as inadequate (Riegel et al., 2009).

Descriptive statistics of frequency and percentage distribution were identified for the respondent's essential sociodemographic and clinical characteristics. A Chi-square test was performed to determine the correlation between the two variables in the study.

3. Results and Discussion

This study involved 100 respondents with 60.0% of them are male, and the largest age group is above 65 years (42.0%). Most of the respondents are still actively working (60%) and currently married (83.0%). Nearly half of the respondents have a college degree (48%), with 100.0% ownership of health insurance. The majority of respondents belonged to the functional class of the New York Heart Association (NYHA) at level I (80.0%) and had comorbidities (94%).

Table 2 Sociodemographic and clinical characteristics

Characteristics	Number (n)	Percentage (%)	Mean±SD
Gender			
Male	60	60,0	
Female	40	40.0	
Age (years)			62.7±10.9
20-25	1	1.0	
26-35	0	0.0	
36-45	3	3.0	
46-55	19	19.0	
56-65	35	35.0	
> 65	42	42.0	
Occupation			
Working	60	60.0	
Not working or pension	40	40.0	
Marital status			
Married	83	83.0	
Widowed	17	17.0	
Level of education			
Never attend school	17	17.0	
Primary school	8	8.0	
Junior high school	5	5.0	
Senior high school	22	22.0	
University	48	48.0	
Ownership of health insurance			
Yes	100	100.0	
No	0	0.0	
Class of NYHA			
I	80	80.0	
II	16	16.0	
III	4	4.0	
IV	0	0.0	
Comorbidity			
Yes	6	6.0	
No	94	94.0	
Length of suffering heart failure (years)			4.6±2.4
< 1	2	2.0	
1-5	67	67.0	
6-10	30	30.0	
> 10	1	1.0	

The respondents mostly had heart failure in the range of 1-5 years (67.0%). The essential characteristics of the respondents can be seen in Table 2. Figure 1 shows that self-care management is the highest self-care level (96.2%), while self-care confidence has the lowest percentage of adequate (13.0%). The order of the highest mean scores from the highest includes self-care management (78.1±7.9), self-care maintenance (68.6 ± 6.8), and self-care confidence (71.1±0.8). Meanwhile, based on the cardiovascular health profile, the highest percentage is respondents with 3 out of 5 ideal cardiovascular profiles (42.0%) (see Figure 2). Five metrics of cardiovascular health profiles are presented in Table 3. Smoking status is the highest metric with an ideal percentage of 95.0%, while the lowest is the random blood glucose metric (14.0%).

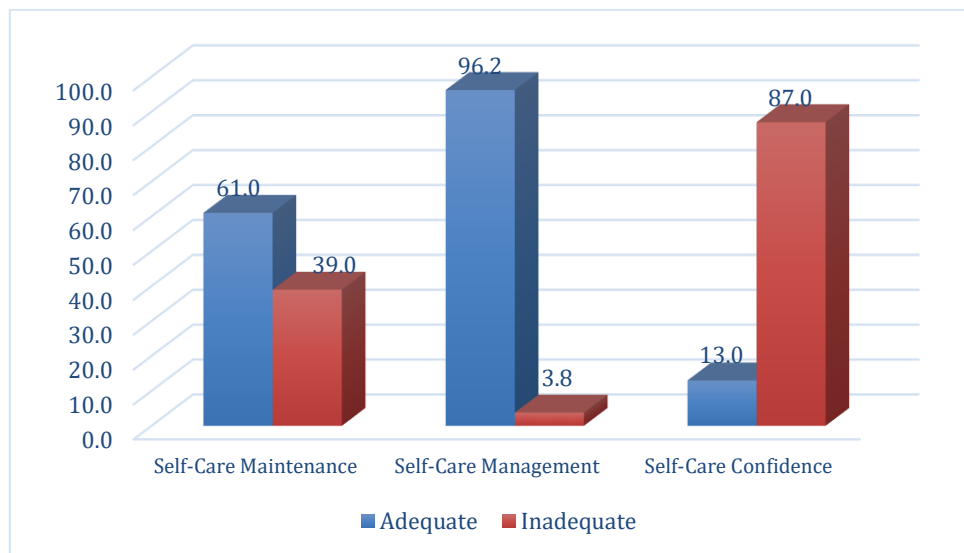


Figure 1 Comparison between the percentage of respondents with adequate self-care and Inadequate self-care in the three dimensions of self-care

Table 3 Cardiovascular health profile

Metric	Poor		Intermediate		Ideal		Mean	Standard deviation
	n	%	n	%	n	%		
Smoking	0	0.0	5	5.0	95	95.0	-	-
Body mass index (BMI) (kg/m ²)	6	6.0	40	40.0	54	54.0	24.6	2.9
Total cholesterol (mg/dL)	1	1.0	8	8.0	91	91.0	148.8	33.5
Blood pressure (mmHg)	25	25.0	54	54.0	21	21.0	130.6/72.5	17.3/13.3
Random blood glucose level (mg/dL)	1	1.0	85	85.0	14	14.0	131.2	30.9
Total profile	39	39.0	42	42.0	19	19.0	-	-

The correlation test results between self-care and the total cardiovascular health profile showed no significant relationship between the two variables (Table 4). However, the self-care maintenance dimension significantly relates to total cholesterol levels with a value of $p = 0.008$ (Table 5).

There were three main findings of this study. First, self-care maintenance and self-care management of the participants was adequate. Second, only a small number of our sample participants had achieved ideal cardiovascular health profile as defined. Third, those with higher self-care maintenance scores had a lower cholesterol level. The incidence of heart failure increases with age. Our study points out that the mean of the patients' age was 62.7 ± 10.9 years.

Furthermore, this study's findings align with the age trend of heart failure patients in Asia, over 60 years of age (Tromp et al., 2019). Heart failure prevalence is more significant in males than females. The underlying mechanisms by which sex may influence HF risk may lie in genes. It is because of the XY chromosome configuration in males. Some genes on the Y chromosome relate

to cardiovascular risk factors such as increased blood pressure, increased low density lipoprotein (LDL) cholesterol, and tendency to myocardial infarction (Razzolini & Lin, 2015).

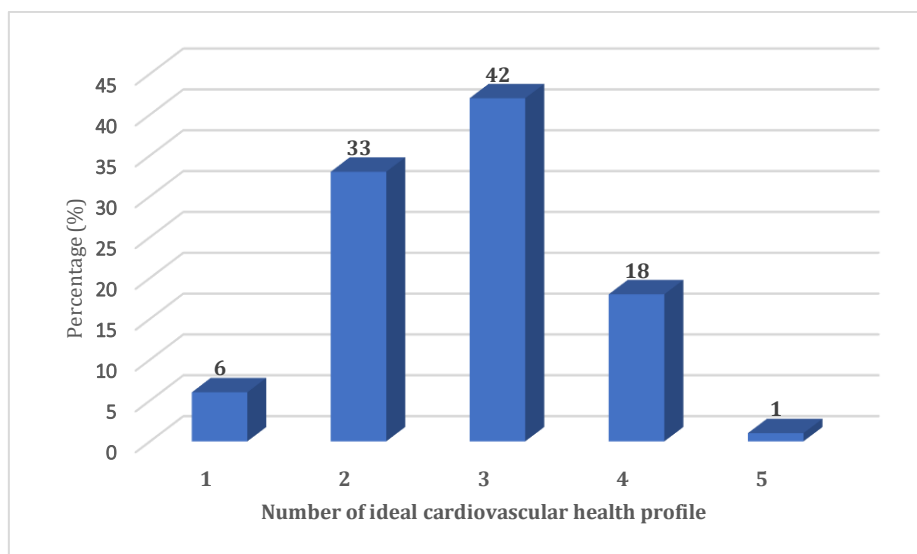


Figure 2 Percentage of respondents with ideal cardiovascular health profile

Table 4 Analysis of the relationship between the three dimensions of self-care and the total cardiovascular health profile

Dimension of self-care	Total cardiovascular health profile						p-value
	Ideal		Intermediate		Poor		
	n	%	N	%	n	%	
Self-care maintenance (n=100)							0.54
Inadequate	7	17.9	19	48.7	13	33.3	
Adequate	12	19.7	23	37.7	26	42.6	
Self-care management (n=26)							0.49
Inadequate	0	0.0	0	0.0	1	100.0	
Adequate	2	8.0	11	44.0	12	48.0	
Self-care confidence (n=100)							0.68
Inadequate	16	18.4	38	43.7	33	37.9	
Adequate	3	23.1	4	30.8	6	46.2	

Our results demonstrated that the dimension of self-care management and self-care maintenance have exceeded the value of 70 or are considered adequate, while the dimension of self-care confidence is lower than 70. Although the self-care score is slightly higher, the order of the dimensions with the highest score is in line with previous studies with self-care management, self-care maintenance, and self-care confidence (Mei et al., 2019).

Self-care management is the ability to recognize symptoms and take action to treat the emerging symptoms. Most of the respondents' actions reduce salt intake, limiting fluids, taking diuretic drugs, and asking health workers for help. Reducing salt intake plays a vital role in the management of heart failure. The high salt intake can worsen salt and water retention in patients with heart failure, and it worsens symptoms of heart failure (He et al., 2011). The management of heart failure recommends a maximum salt (sodium) intake of 1500 mg/day (Yancy et al., 2013). Self-care maintenance is actions taken by patients with heart failure to maintain their health status. In this study, most respondents used reminders to take medication, weighing, reducing salt intake, and checking the feet if any were swollen. Salt and fluid restriction have been proven to reduce heart failure symptoms (Shao et al., 2013).

Table 5 Analysis of the relationship between the dimension of self-care maintenance and cardiovascular health profile

Dimensions of Self-care Maintenance (n=100)	Ideal		Intermediate		Poor		p-value
	n	%	N	%	n	%	
Body mass index (BMI)							0.31
Inadequate	24	61.5	14	35.9	1	2.6	
Adequate	30	49.2	26	42.6	5	8.2	
Blood pressure							0.70
Inadequate	9	23.1	19	48.7	11	28.2	
Adequate	12	19.7	35	57.4	14	23.0	
Total cholesterol							0.008
Inadequate	32	82.1	7	17.9	0	0.0	
Adequate	59	96.7	1	1.6	1	1.6	
Random blood glucose							0.25
Inadequate	7	17.9	31	79.5	1	2.6	
Adequate	7	11.5	54	88.5	0	0.0	
Smoking status							1.00
Inadequate	37	94.9	2	5.1	0	0.0	
Adequate	58	95.1	3	4.9	0	0.0	

Self-care confidence shows the level of confidence of patients to avoid the recurrence of heart failure symptoms. The results of the present study indicated that the respondents' self-confidence is very low. Self-confidence has been proved to increase adherence to self-care (Warren-Findlow et al., 2012). Thus, self-care confidence in patients with heart failure needs to be increased. One of the interventions that nurses can do is to increase health literacy in heart failure patients. Previous research has shown that increasing health literacy can increase self-care confidence in heart failure patients (Dennison et al., 2011). Increasing health literacy can be done by nurses by providing health education to patients. This education has proven that this education improves self-care in heart failure patients (Malara & Syarul, 2020). Self-care confidence can also be improved by improving social support quality in heart failure patients (Salyer et al., 2012).

Our findings also suggest that an ideal cardiovascular health profile is difficult to achieve. Only ten subjects in this study had achieved five ideal cardiovascular health profile. The cardiovascular profile metric with the highest ideal percentage is smoking status, in which 95.0% of respondents never had or had stopped smoking for > 12 months. The previous study showed that the risk of heart failure is 1.43 times in people who smoke one pack per day and 1.37 times for former smokers (Feodoroff et al., 2018). Another study showed that active smoking is associated with a 75% increased risk of heart failure than non-smokers (Prescott, 2019). This present study revealed that participants' blood pressure and blood glucose levels still need attention. The ideal percentage for both metrics is below 25%. Diabetes and heart failure are closely related in which patients with diabetes have an increased risk of getting heart failure, and on the other hand, those who have heart failure have a higher risk of getting diabetes (Rosano et al., 2017; Wilkinson et al., 2019). Increased blood glucose levels above ≥ 126 mg/dL is a symptom of diabetes mellitus. Diabetes mellitus increases the risk of morbidity and mortality of patients with heart failure (Dunlay et al., 2019). Therefore, in the management of heart failure, lowering blood glucose levels is crucial to do.

Controlling blood pressure is essential in the management of patients with heart failure. In this study, respondents had an average blood pressure of 130.6/72.5 mmHg. The target systolic

blood pressure of <120 mm Hg can significantly reduce the recurrence rate of heart failure symptoms, which require an emergency room visit or hospitalization (Upadhya et al., 2017). Uncontrolled systolic blood pressure increases the mortality rate in patients with heart failure (Ather et al., 2011).

Our results are showing no association between self-care and the total cardiovascular health profile. Nevertheless, self-care maintenance is significantly associated with cholesterol levels. Some potential limitations of this study may be the cause of this finding. First, the respondents are homogeneous in which they only come from one hospital. Second, this study only assessed 5 out of 7 metrics in the cardiovascular health profile, so the results do not represent a comprehensive cardiovascular health profile. Thus, further research needs to be done with larger heterogeneous samples and assess cardiovascular health profile metrics. Maintaining average body weight and no smoking can maintain an ideal cardiovascular health profile in the elderly (Gooding et al., 2015). Regular exercise is an alternative to maintain optimal lipid levels and blood pressure (Mohr et al., 2014).

Moreover, this study identified a significant association between self-care maintenance and cholesterol levels in outpatients with heart failure. Participants with adequate self-care maintenance had a lower cholesterol level. In self-care maintenance, physical activity and exercise affect cholesterol levels. Regular exercise and controlled physical activity in patients with cardiovascular disease have been proven to positively reduce blood cholesterol levels (Kokkinos & Myers, 2010; Mann et al., 2014). Exercise plays a vital role in prevention and acts as a therapy for heart failure patients (Cattadori et al., 2018; Schindler et al., 2019). Epidemiological data showed that regular exercise (30 minutes of walking every day) with moderate intensity could reduce the mortality rate by 16% and reduce by 40% for high intensity (Schindler et al., 2019).

4. Conclusion

In conclusion, no prior study has evaluated the correlation between self-care behavior and cardiovascular health profile outcome among patients with heart failure. This study suggests that two of the three dimensions of self-care have reached adequate levels. Our findings also demonstrated that only a few participants in our study achieved an ideal cardiovascular health profile. Finally, further study of the impact of self-care behavior on cardiovascular health profile will better inform disease management's effectiveness on the patient's outcome with heart failure.

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