1

RESEARCH ARTICLE

Adherence to Self-Care Behaviors and Associated Factors among Adult Heart Failure Patients Attending Chronic Follow-Up Care at Jimma University Medical Center, Southwest Ethiopia

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Abstract:

Background:

Optimal outcomes and quality of life in patients with heart failure (HF) depend on effective self-care activities. However, patients may experience difficulties, and their performance may be inconsistent.

Aim:

To determine the level of adherence to self-care behaviors and associated factors among adult HF patients attending chronic follow-up care at Jimma University Medical Center (JUMC).

Methods:

A cross-sectional study was conducted between August and September 2021. Data were collected through face-to-face interviews and by reviewing patients' medical records. The collected data were analyzed using SPSS version 25 and the findings were presented in frequency, percentage, mean (SD), and median (IQR). Multivariate logistic regression was performed to determine factors associated with adherence to self-care behaviors. Odds ratios with 95% confidence intervals and p-values were used to report the findings.

Results:

Out of 266 HF patients, 50.0% had good adherence towards self-care behavior recommendations. The highest following recommendation was taking medication as prescribed (75.5%), followed by a dietary recommendation of a low-salt diet (45.2%). Participants who could not read and write (adjusted odds ratio (AOR) = 0.30 (95% confidence interval (CI) 0.13, 0.71), P = 0.006), had an illness duration greater than or equal to ten years (AOR = 0.31 (95% CI 0.12, 0.82), P = 0.02), in the NYHA class II HF (AOR = 0.33 (95% CI 0.15, 0.73), P = 0.007) were negatively associated with good adherence to self-care behavior recommendations.

Conclusion:

In this study, only half of the respondents had good adherence to self-care behaviors. Lower educational level, longer illness duration, and NYHA class II HF were predictors of poor adherence to self-care. Therefore, nurses should devise strategies to counsel or educate the HF patients on self-care practice recommendations, particularly patients with a lower education level and who lived longer with HF.

Keywords: Adherence, Adherence score, Self-care behaviors, Self-care maintenance, Adults, Heart failure.

1. BACKGROUND

Heart Failure (HF) is a clinical syndrome characterized by cardinal signs and symptoms (breathlessness, ankle swelling,

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fatigue, elevated jugular venous pressure, pulmonary crackles, and peripheral edema). In 2021, the incidence of HF in Europe was approximately 3/1000 person-years (all age groups) or 5/1000 person-years in adults [1]. Approximately 6 million American adults aged ≥ 20 years had HF according to data from 2015 to 2018 [2]. With aging population, the prevalence of HF has risen dramatically in recent decades [3]. However, in

Sub-Saharan Africa (SSA), unlike high-income countries, HF is a disease of young and middle-aged adults with attendant high disability-adjusted life years. In SSA, HF accounted for 9.4–42.5% of all medical admissions and 25.6–30.0% of admissions into cardiac units [4].

Patient education and support for HF patients are needed to improve their self-care behaviors and are the goal of many HF management programs [5]. Self-care is essential for the long-term management of chronic heart failure. It can be defined as the process of maintaining health through health-promoting and preventive practices [6]. HF-related self-care behavior reflects the actions that HF patient undertakes to maintain life, healthy functioning, and wellbeing. Self-care includes behaviors such as adherence to medication, diet, and exercise, as well as self-management of symptoms; however, it also refers to behaviors such as daily weighing to assess fluid retention and seeking assistance when symptoms occur [5]. Literature indicates that patients with HF who have more effective self-care have better quality of life, and lower mortality and readmission rates than those with lower levels of self-care [6].

Worldwide, self-care behaviors are suboptimal in HF patients [7]. In a study by Sedlar *et al.* from Slovenia, more than half (51%) of the HF patients were reported to be inadequate in their self-care [8]. A systematic review revealed a diverse range of personal and environmental factors associated with self-care behaviors in heart failure patients. Age, health-related quality of life, sex, education, New York Heart Association class, depressive symptoms, and left ventricular ejection fraction were most often correlated with the European Heart Failure Self-care Behaviour Scale (EHFScBs) score [9], which was an internally consistent and valid instrument to measure HF-related self-care behaviour [5]. Regarding specific HF self-care behaviors, a study from Taiwan reported at least half of the HF patients never or rarely weighed themselves (50%) or checked their ankle swelling (62.8%). Moreover, 77.3% of the patients did not ask for low-salt items when eating out or visiting others [10].

There is a gap in the literature from Sub-Saharan Africa (SSA) because there is a scarcity of data regarding self-care behaviors among HF patients. A study from South Africa reported that among adult HF patients, adherence to self-care behaviors ranged from 2.5% to 98%. Daily weight monitoring and keeping a moderate alcohol intake (one beer, one to two glasses of wine per day) were the lowest and the highest rates of adherence, respectively [11]. In Ethiopia, few studies were published [12 - 15] regarding self-care behaviors among HF patients. The rate of good adherence to self-care behaviors was 22.3% in a study by Seid *et al.* [12] and 51.2% in a study by Fetensa *et al.* [15]. A higher level of good adherence was noted for taking prescribed medication (93.2%) and had follow-up appointments (90.2%). However, a higher level of poor adherence was noted for weight monitoring (87.6%), regular exercise (85.6%), and fluid restriction (70.5%) [14]. Gebru *et al.* [13] identified that age, educational level, comorbidity, knowledge about HF, and social support were significantly associated with self-care behavior. There was a scarcity of published studies related to self-care behaviors among HF patients in our setting, Jimma University Medical center (JUMC).

Self-care education, including the control of non-pharmacological measures, should be part of the daily management of HF patients both hospital and ambulatory settings. Nurses at HF follow-up clinics together with other professionals integrating the multidisciplinary team have played a fundamental role in the follow-up and management of patients [16]. Optimal outcomes for patients with HF depend on their engagement in effective self-care activities. Effective HF self-care is associated with several positive outcomes such as improved quality of life and reduced mortality, morbidity, and healthcare costs. Therefore, this study aimed to determine the level of adherence to self-care behaviors and assess the factors associated with self-care among adult HF patients attending follow-up care at JUMC.

1.1. The Specific Objectives of this Study were

- To determine the level of adherence to self-care behavior among adult HF patients attending chronic follow-up care.
- To identify specific self-care behavior recommendations being followed by the HF patients
- To determine the factors or predictors associated with adherence to self-care behaviors among adult HF patients

2. MATERIALS AND METHODS

2.1. Study Area and Period

The study was conducted at chronic follow-up care of Jimma University Medical Center (JUMC). Jimma is found in the Oromia region, southwest of the capital city, Addis Ababa/Finfinnee at 352 kilometers. JUMC provides healthcare services for approximately 15 million people in Southwest Ethiopia. It provides outpatient services for approximately 160,000 attendants per year [17]. The study was conducted from August 1 to September 01, 2021.

2.1.1. Study Design

A cross-sectional study design was used.

2.1.2. Study Population

Adult HF patients who were attending chronic follow-up care, visited flow-up care for at least three months, on at least one standard HF drug therapy, and aged above 18 years. Patients who were critically ill, could not communicate, or had a mental illness were excluded. The number of excluded patients was not counted because only consecutive patients who fulfilled the inclusion criteria were included.

2.2. Sample Size

The sample size was determined using a single proportion formula with the assumption of a 95% confidence interval and 5% margin of error. The prevalence of good self-care behavior (22.3%) was obtained from a study conducted at Gondar University referral hospital [12]. Thus, using the formula, the

sample size for this study was calculated as 266.

2.3. Sampling Techniques and Procedures

The consecutive sampling technique was used to select patients who visited chronic follow-up care at JUMC during the data collection period. The study participants were enrolled until the required sample size was reached.

2.4. Data Collection

The questionnaires were first prepared in English, translated into local languages (Afaan, Oromo, and Amharic), and back-translated into English to maintain consistency. Two trained clinical nurses and two clinical pharmacists collected data through face-to-face interviews using semi-structured questionnaires and by reviewing the medical records of the patients. The authors of this study supervised the data collection process. All information relevant to the study was forwarded to the patients, and their answers were recorded using a questionnaire. The questionnaire contained subsections on socio-demographic data, clinical disease characteristics, history of hospitalization, self-care behavior items, and HF knowledge items.

2.5. Data Collection Instrument

The validated data collection tool, the modified European Heart Failure Self-care Behavior Scale (EHFScBS) [5], was used to assess the self-care behaviors of the participants. In this study, six items on EHFScBS were used after the pretest was conducted with HF patients on follow-up. For each item, patients were asked to rate their self-care behavior on a five-point scale from '1' strongly disagree to '5' strongly agree. The minimum score was 6, and the maximum score was 30; where a higher mean score indicates good self-care behavior. To assess the level of knowledge of HF by the participants, the Japanese Heart failure Knowledge scale (JHFKS) [18] was used. Fourteen items were selected out of 15 based on the applicability of the items in our setting. The scale evaluates the knowledge of patients regarding HF symptoms, HF-related treatment, and self-care. The questions were used to assess patients' HF knowledge with a choice of (yes, no, and I don't know). The correct answer for the specific question was given '1' score and otherwise '0'. The scores for each item were summed, giving a range of total scores from 0 to 14. Higher scores indicate greater knowledge of HF.

2.5.1. Dependent Variable

Adherence to self-care behavior

2.5.2. Independent Variables

Socio-demographic status (age, sex, marital status, education, *etc*.), clinical factors: comorbidity, duration of heart failure, New York Heart Association (NYHA) class, history of admission, HF knowledge of the participants

2.6. Data Quality Control and Management

Before starting data collection, a pretest was performed on 5% of the randomly selected patients to determine if the data collection format was applicable, appropriate, and consistent;

any modifications were then applied. During the data collection procedures, the investigators reviewed and checked the collected data daily for its completeness, accuracy, and clarity. Any completed questionnaires with faulty data were excluded.

2.7. Data Analysis

The data were checked, cleaned, and analyzed using SPSS version 25. Descriptive statistics were used to describe the findings. The results were presented as frequency, percentage, median (interquartile range, IQR), and mean (standard deviation, SD). A logistic regression model was used to determine variables associated with adherence to self-care behavior. Model fitness was checked using the Hosmer–Lemeshow test (P > 0.05). Initially, univariate logistic regression was performed and variables with a P-value of less than 0.25 were identified. Then, all variables with a P value less than 0.25 were entered in multivariate logistic regression using a backward stepwise method. Finally, an adjusted odds ratio was reported along with a 95% confidence interval, and a P value less than 0.05 was used to indicate statistical significance.

2.8. Ethics Approval and Consent to Participate

Ethical clearance was obtained from the Institutional Review Board (IRB) of Jimma University. The IRB approval number for this study was Ref. No. Phar/630/2013. Before data collection, the purpose of the study, method of data collection, and presence confidentiality was provided to all eligible participants. Written informed consent was obtained from each participant after he or she was willing to participate. Confidentiality was maintained by omitting their names on the questionnaire.

2.8.1. Participants' Rights

The participants were informed that they had the full right to participate or not to participate in the study as well as to withdraw any time during the interview.

2.9. Operational Definition

2.9.1. Adherence

It is defined as 'the extent to which HF patients' behavior (taking medication, following a low-salt diet, exercising regularly, or contacting healthcare providers when the symptom increases) corresponds with agreed recommendations from the health care providers [19].

2.9.2. Self-care Behaviors

Self-care involves behaviors such as taking medications, monitoring and interpreting symptoms, keeping appointments, and contacting healthcare providers when needed. The patients were classified as "Good adherent" to self-care behaviors when their mean adherence score was greater than the overall mean score and "Poor adherent" when the mean adherence score of the participants was below the overall mean score [15, 20]. The mean scores for individual self-care behaviors were also calculated. Moreover, a patient was considered adherent to specific behavioral recommendations, when his/her response to

that item was "agree and strongly agree" [21, 22]. In this study, participants who correctly answered ≥ 75% of the knowledge-related questions were considered to have adequate knowledge of HF [12, 14].

3. RESULTS

3.1. Sociodemographic Characteristics of HF Patients

In this study, 266 adult HF patients on follow-up care were included. The median (IQR) age of the participants was 45.0 (32.0, 57.0) years. Female participants accounted for 54.1%. More than two-thirds (68.4%) of the participants were married. Regarding educational status, more than one-third (37.2%) of the participants were unable to read or write. Forty participants (15.0%) were government employees (Table **1**).

Table 1. Socio-demographic characteristics of HF patients attending chronic care follow-up at JUMC

Variables	Category	Frequency	Percentage
Sex	Male	122	45.9
	Female	144	54.1
Age (median, range) years: 45 (19 - 78)			
Marital status	Married	182	68.4
	Single	55	20.7
	Widowed	19	7.1
	Divorced	10	3.8
Education	Cannot read and write	99	37.2
	Primary school	61	22.9
	Secondary school	52	19.5
	College and above	54	20.3
Occupation	Government employee	40	15.0
	Merchant	54	20.3
	House wife	74	27.8
	Farmer	55	20.7
	Others	43	16.2

3.2. Clinical Characteristics of HF Patients

The median (IQR) duration of HF was 4.0 (2.0, 7.0) years. In more than half (54.5%) of the participants, the duration of heart failure was less than four years. About 70.0% of the participants had NYHA classes II and III. A total of 206 participants had documented ejection fraction (EF). The minimum and maximum EF were 29.0% and 45.0%, respectively. Most patients (86.9%) had an EF ≤ 40%. Among 266 study participants, 47.4% had chronic comorbidities. During the past six months, 33.1% of the participants had a history of hospitalization. Among those admitted, 43.2% were admitted twice within the past six months (Table **2**).

3.3. Patterns of Cardiovascular (CV) Medications used by the HF Patients

The median (IQR) number of medications taken by participants was 3.0 (2.0, 4.0). As shown in Table **3**, almost all patients were taking renin-angiotensin system (RAS) blockers (98.8%), followed by diuretics (85.0%). Of the RAS blockers, 76.3% were enalapril, and the rest was losartan (22.6%). A small number (7.5%) of HF patients have been taking digoxin (Table **3**).

Table 2. Clinical characteristics of HF patients attending chronic care follow-up at JUMC.

Variables	Category	Frequency	Percentage
NYHA class	I	46	17.3
	II	94	35.3
	III	92	34.6
	IV	34	12.8
Duration of illness	1 to 4 years	145	54.51
	5 to 10 years	93	34.96
	≥10 years	28	10.53
Comorbidity	Yes	126	47.37
	No	140	52.63
Hospitalization, in 6 months	Yes	88	33.1
	No	178	66.9

Notes: NYHA: New York Heart Association

Table 3. Patterns of CV medications used among the heart failure patients attending chronic follow-up care at JUMC.

Medications	Frequency	Percent
RAS blockers (enalapril and losartan)	263	98.9
Diuretics (furosemide and spironolactone)	226	85.0
Beta-blockers (metoprolol and atenolol)	120	45.1
Calcium channel blockers (amlodipine)	38	14.3
Cardiac glycoside (digoxin)	20	7.5
Others (atorvastatin, metformin, and aspirin)	151	56.7

Keys: RAS: Renin-Angiotensin-System

3.4. Level of Adherence to Self-care Behaviors

Self-care behavior was assessed using modified EHFScBS with six items. The reliability (Cronbach's alpha) for the six items was 0.61. The overall mean score of the six items was 3.04. The patients were considered to have good self-care if their mean adherence score was higher than the overall mean score. Accordingly, half (50.0%) of the study participants had good adherence to self-care behaviors. Regarding the individual self-care behavior recommendation, the mean adherence score of the participants for the prescribed medications was the highest (mean = 3.75 ± 0.55), where 75.5% of the participants reported following the recommendation "I take medication as prescribed", followed by the recommendation of dietary modification of a low-salt diet (mean = 3.41 ± 0.65). The items with low mean adherence scores were contacting doctors when legs/feet were swollen and shortness of breath increased, with a mean score of 2.47 ± 0.80 and 2.61 ± 0.74, respectively. In this study, only 15.8% and 12.8% of the study participants reported following the recommendation" I contact a doctor if short of breath increases and my legs/feet are swollen", respectively (Table **4**).

3.5. Level of Heart Failure Knowledge of Patients

The level of HF patients' knowledge was assessed using 14 items from the JHFKS. Reliability for the 14 items was r = 0.70. Patients who correctly answered ≥ 75% of the knowledge-related questions were considered to have adequate knowledge. In this study, only 75 (28.2%) of the study participants had adequate knowledge of their disease (Table **5**).

3.6. Factors Associated with Adherence to Self-care Behaviors among HF Patients

Based on the multivariate logistic regression analysis, among the potential variables, three were statistically associated with participants' adherence to self-care behaviors. Participants who could not read and write were 70.0% less likely to be good adherent (adjusted odds ratio, AOR = 0.30 (95% confidence interval (CI) 0.13, 0.71), P = 0.006) to self-

care behaviors compared to participants who had a college degree and above. Similarly, participants who had an illness duration greater than or equal to ten years were less likely to be good adherent (AOR = 0.31 (95% CI 0.12, 0.82), P = 0.02) to self-care behaviors compared to participants with an illness duration of less than four years. Moreover, being in NYHA class II HF was associated with having poor adherence to self-care behaviors (AOR = 0.33 (95% CI 0.15, 0.73), P = 0.007) compared to individuals in NYHA class I HF (Table **6**).

Table 4. Self-care adherence scores among HF patients attending chronic follow-up care at JUMC.

Self-care Behaviors	Mean	SD	Percentages of Responses per each Likert Point				
			Strongly Disagree [1]	2	3	4	Strongly Agree [5]
Weigh every day	3.03	0.82	1.5	28.2	36.1	34.2	-
Exercise regularly	2.98	0.97	8.3	22.9	31.6	36.8	0.4
Eat low salt diet	3.41	0.65	-	6.4	48.5	42.9	2.3
Take medication as prescribed	3.75	0.55	-	3.4	21.1	72.9	2.6
Contact doctor if short of breath increases	2.61	0.74	-	45.9	38.3	12.8	3.0
Contact my doctor if my legs/feet swollen	2.47	0.80	0.8	67.3	19.2	9.8	3.0
Overall mean	3.04	0.41					

SD: Standard Deviation

Table 5. Distribution of item responses with the knowledge level of HF patients attending chronic follow-up care at JUMC.

Knowledge Items	% of Correct Answer	Yes (%)	No (%)	I don't know
HF in general				
Exchange of O_2 and CO_2 occurs in the heart	138(51.9%)	86(32.3%)	138(51.9)	42(15.8%
HF is a condition in which the heart is not able to pump blood through the body in the sufficient amounts	155(58.3%)	155(58.3%)	38(14.3%)	73(27.4%)
HF symptoms and signs				
Difficulty in breathing and SOB are symptoms of HF	234(88%)	234(88%)	11(4.1%	21(7.9%)
One of the symptoms when the lung is congested with the fluid is SOB	136(51.1%)	136(51.1%)	46(17.3%	84(31.6%)
Some patients with severe HF become breathless when they lie flat and feel much better when they sit up	151(56.8%)	40(15%)	151(56.8%)	75(28.2%)
Short term weight gain is one of the signs of worsening HF	155(58.3%)	155(58.3%)	64(24.1%)	47(17.7%)
HF-related treatment and self-care				
Overwork and stress sometimes cause HF to get worse	194(72.9%)	194(72.9%)	22(8.3%)	50(18.8)
Sodium causes water retention	101(38%)	101(38%)	94(53.3%)	71(26.7%)
Diuretics remove fluids from the body	109(41%)	109(41%)	103(38.7%)	54(20.3)
HF patients are discouraged from taking medications without food	141(53%)	100(37.6%)	141(53%)	25(9.4%)
HF patients had better drink more water than healthy people	144(54.1%)	46(17.3%)	144(54.1%)	76(28.6%)
HF patients had better take a high salt diet	232(87.2%)	21(7.9%)	232(87.2%)	13(4.9%)
Smoking is good for patients with HF because it promotes the circulation of blood	189(71.1%)	41(15.4%)	189(71.1%)	36(13.5%)
HF patients should not perform exercise regardless of their severity of HF	129(48.5%)	101(38%)	129(48.5%)	36(13.5%)

Table 6. Bivariate and multivariate logistic regression of factors associated with good adherence to self-care behaviors in HF.

Variables	Category	COR	P value	AOR	95% CI	P value
Age	< 50 years (reference)	-	-	-	-	-
	≥ 50 years	0.57	0.027	0.76	0.32, 1.75	0.51
Sex	Female (reference)	-	-	-	-	-
	Male	1.13	0.62	-	-	-
Marital status	Married	1.45	0.36	-	-	-
	Single	1.58	0.32	-	-	-
	Divorced/widowed (reference)	-	-	-	-	-

(Table 6) contd.....

Variables	Category	COR	P value	AOR	95% CI	P value
Education level	Coud not read and write	0.30	0.001	0.30	0.13, 0.71	0.006*
	Primary school	0.67	0.31	0.77	0.34, 1.77	0.54
	Secondary school	0.46	0.054	0.48	0.21, 1.10	0.082
	College and above (reference)	-	-	-	-	-
Occupation	Government employee	1.61	0.29	0.73	0.17, 3.18	0.67
	Merchant	0.93	0.87	1.06	0.41, 2.75	0.89
	Housewife	0.78	0.52	1.28	0.48, 3.44	0.62
	Farmer	0.54	0.13	0.91	0.32, 2.55	0.86
	Others (reference)	-	-	-	-	-
Duration of illness	1 - 4 years (reference)	-	-	-	-	-
	5 – 9 years	0.79	0.39	0.75	0.37, 1.53	0.43
	≥ 10 years	0.30	0.002	0.31	0.12, 0.82	0.02*
Hospitalization, 6 months	Yes	0.66	0.12	0.99	0.50, 2.00	0.99
	No (reference)	-	-	-	-	-
Comorbidity	Yes	0.88	0.62	-	-	-
	No (reference)	-	-	-	-	-
NYHA class	I (reference)	-	-	-	-	-
	II	0.25	0.000	0.33	0.15, 0.73	0.007*
	III	0.33	0.004	0.64	0.26, 1.61	0.34
	IV	0.63	0.35	2.08	0.63, 6.83	0.22
Number of medications	< 5 (reference)	-	-	-	-	-
	≥ 5	1.26	0.55	-	-	-
Knowledge	Inadequate	0.61	0.078	0.76	0.42, 1.38	0.37
-	Adequate (reference)	-	-	-	-	-

COR/AOR: Crude/Adjusted Odds Ratio, CI: Confidence Interval.

*indicates statistical significance.

4. DISCUSSION

Self-care is a naturalistic decision-making process that patients use in the choice of behaviors that maintain physiological stability (symptom monitoring and treatment adherence) and response to symptoms when they occur [23]. Patients with HF who report more effective self-care behaviors have a better quality of life, lower mortality and readmission rates than those with lower levels of self-care [6]. Thus, this study was designed to determine the level of adherence to self-care behaviors among adult HF patients attending chronic follow-up care at JUMC. The results of the study indicated that half of the HF patients on follow-up care in our setting had good adherence to HF self-care behavior recommendations. Participants' education level, illness duration, and HF NYHA class were factors associated with adherence to self-care.

Regarding the background of the participants included in this study, 70.0% had NYHA classes II and III. Similarly, in several studies, the included participants mainly had HF NYHA functional classes II and III [11, 21, 24]. One-third of the patients in our study had a history of hospitalization in the past 6 months. In the same way, in a study by Vellone *et al.*, 54.5% of the patients were hospitalized at least once [24].

In this study, only half of the study participants had good adherence to self-care behavior recommendations. Our result is almost comparable to studies done in Slovenia by Sedlar *et al.* [8], in Ethiopia by Fetensa *et al.* [15], and Seid *et al.* (20), where 49.0%, 51.2%, and 52.0% of heart failure patients had good adherence to self-care behavior recommendations, respectively. However, our result is higher compared to studies

by Gebru *et al.* (45.8%) [13], Tegegn *et al.* (28%) [14], and Seid *et al.* (22.3%) [12]. The difference in the findings might be related to the use of a different number of items to measure self-care behaviors. It might also be related to the differences in the level of education of the participants. For example, in studies by Seid *et al.* [12] and Gebreu *et al.* [13], about half of the participants had an educational level of illiterate compared to the 37.2% in our study. In support of this, studies have shown that HF patients with higher education were associated with higher self-care maintenance [25, 26].

Regarding the individual self-care recommendations, the most followed self-care behavior recommendation was "I take medication as prescribed" by 75.5% of the participants. Similar findings were reported by Lee *et al.* from the USA [27], Zamanzadeh *et al.* from Iran [28], Tegegn *et al.* and Seid *et al.* from Ethiopia [12, 14], Sedlar *et al.* from Slovenia [8], and Alber *et al.* from USA [29]. The reason for a higher proportion of patients following the recommendation to take medicines as prescribed could be that HF is a chronic condition associated with syndromes of symptoms that limit the patients' daily physical and social activities; and HF patients who take their medications as prescribed might find they have fewer symptoms. In addition, taking medications does not require active effort, whereas other self-care behaviors do. Thus, all self-care behavior recommendations should be reinforced by nurses during follow-up visits to facilitate better treatment outcomes for patients with chronic HF.

This study revealed that the least followed self-care behavior recommendation was contacting doctors when one

had shortness of breath (SoB) or swollen feet or legs. Similarly, in a study by Santesmases-Masana R *et al.*, contacting doctors/nurses when experiencing SOB and swollen leg/feet was lower compared to other recommendations [30]. However, our study contrasts with a study by Seid *et al.*, in which, patients were more frequently contacted by doctors or nurses when they experienced shortness of breath and a sign of legs/feet edema [20]. A similar finding was also reported by Zamanzadeh *et al.* from Iran, where the item "regular visits to the doctor or nurse" was the second following recommendation only after the item "Taking medication in the prescribed time" [28] The difference in the patients contacting doctors/nurses when symptoms occur might be related to socioeconomic differences between patients, or lack of knowledge related to its importance.

Studies have confirmed that patient socio-demographic characteristics and disease state affected HF self-care adherence [9]. Our analysis revealed that the participants who could not read and write were 70.0% less likely to adhere to HF self-care behaviors compared to patients with a college education. Similarly, in a study by Gebru *et al.*, patients who had an educational level of diploma and above were 2.55 times more likely to have good self-care behavior compared to those who could not read and write [13]. Sedlar *et al.* also reported having an education level below high school was negatively (OR: 0.314) associated with adequate self-care among HF patients [8]. However, in a study by Asadi *et al.*, self-care behavior scores did not have a significant relationship with the level of participants' education [31]. Regarding the HF duration with HF self-care recommendations, patients with an HF duration of ≥ 10 years were less likely to have good adherence to self-care behavior recommendations. However, this finding contrasts with a study by Fetensa *et al.*, where patients with a duration of HF greater than 1 year were positively associated with good self-care recommendations [15]. Gebru *et al.* also reported that patients with an HF duration of less than one year were 62% less likely to have good self-care behaviors [13].

In this study, the last variable associated with self-care behavior recommendations was HF NYHA functional class. Patients with NYHA class II HF were 77.0% less likely to be well adherent to self-care behavior recommendations. Similarly, Gebru *et al.* reported that respondents with NYHA functional class I were 83% less likely to have good self-care [13]. A study conducted in the USA also revealed better HF symptom status was negatively associated with self-care [27]. This may be because patients with HF in the non-advanced NYHA class have lower symptom burdens; so they may not adhere to self-care recommendations. A study reported that when HF symptoms were severe, and self-care was high, health-related quality of life was better than when symptoms were high and self-care was low [32].

5. LIMITATIONS

This study was single-center and included patients on follow-up care who had at least three follow-up visits. Therefore, the findings may not be generalizable to HF patients who were recently diagnosed with HF or those who were recently discharged from the hospital.

6. NURSING IMPLICATIONS AND RECOMMENDA - TIONS

Many HF patients had low levels of knowledge and understanding of heart failure and self-care. The HF guidelines stress the importance of patient education on treatment adherence, lifestyle changes, symptom monitoring and adequate response to possible deterioration [6]. Educational interventions should be used to empower patients to recognize and manage their symptoms. In a study by Son *et al.*, nurse-led HF self-care education significantly reduced the risk of all-cause readmission to the hospital, HF-specific readmission, and all-cause mortality or readmission [33]. Nurses have a crucial role teaching HF patients' self-care abilities, which include weight monitoring, sodium and fluid restrictions, physical activities, regular medication use, monitoring signs and symptoms of disease worsening and early search for medical care. Knowing the level of self-care behaviors in HF patients will help nurses to recognize behaviors that need to be modified or added for better disease control and consequently, better quality of life. Ongoing assessment of HF patients' self-care behaviors should be an essential part of nursing practice. Based on our findings, we recommend that clinicians, in particular nursing professionals, should counsel or educate patients with HF on self-care practice recommendations, particularly patients with a lower education level and who live longer with HF. Local policymakers should also develop strategies to strengthen nursing education on self-care behaviors at follow-care for HF patients.

CONCLUSION

The results of this study indicated that half of the HF patients have poorly adhered to self-care behaviors. Participants' lower education level, longer illness duration, and HF NYHA class II were predictors of poor adherence to self-care.

LIST OF ABBREVIATIONS

EHFScBS	=	European Heart Failure Self-care Behavior Scale
HF	=	Heart Failure
NYHA	=	New York Heart Association
JUMC	=	Jimma University Medical Center
JHFKS	=	Japanese Heart failure Knowledge Scale
IQR	=	Interquartile Range
SD	=	Standard Deviation
CI	=	Confidence Interval
C/AOR	=	Crude/Adjusted Odds Ratio
SOB	=	Shortness of Breath
RAS	=	Renin-Angiotensin System
CV	=	Cardiovascular

ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Ethical clearance was obtained from the Institutional Review Board (IRB) of Jimma University. The IRB approval

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