

Relationship between Disease Knowledge and Self-care Adherence among Heart Failure Patients at King Abdulaziz University Hospital

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Abstract

Backgrounds: Heart failure (HF) is a progressive syndrome characterized by complicated therapeutic regimens and repeated hospitalizations. HF has turned into a global epidemic demonstrating serious mortality and morbidity. This study aimed to assess the relationship between disease knowledge and self-care adherence among adult HF patients at King Abdulaziz University Hospital (KAUH). **Methods:** A cross-sectional descriptive correlational design was utilized. Patients were recruited from outpatient clinic at KAUH in Jeddah, Saudi Arabia. A convenience sample of 208 HF patients. The Dutch Heart Failure Knowledge Scale (DHFS) and the European Heart Failure Self-Care Behavior Scale (EHFSCBs) were used to measure the main study outcomes. Participants were recruited from heart failure outpatient clinics at KAUH from January 31 – May 17, 2021. **Results:** 63.9% of participants were male, 49% were over 61 years old, and 30.8% of the participants were not educated. 55.8% of the participants had an adequate level of knowledge about HF disease and 57.2% had a good level of self-care adherence. The mean total HF knowledge score DHFS was 8.58 ± 3.08 out of 15 and the self-care adherence score EHFSCBs was 28.97 ± 5.61 out of 60. A significant positive moderate correlation existed between disease knowledge and self-care adherence. **Conclusion:** Disease knowledge was adequate in more than half of the participants, and self-care adherence was good. This study has shown a relationship between

disease knowledge and self-care adherence, which means that a high level of HF knowledge was associated with improved self-care adherence.

Keywords: Awareness, Compliance, Heart Failure, Knowledge, Self-care Adherence.

BACKGROUND

Cardiovascular disease (CVD) has been among the most globally common fatal disorders for several decades (Mozaffarian et al., 2016), with 80% of CVD-associated mortalities occurring in low- and middle-income countries (1). One of the most prevalent CVDs is HF, which has become a global epidemic with serious mortality and morbidity (2).

The prevalence of HF is constantly increasing. Around 26 million adults globally are affected by HF (Savarese & Lund, 2017), including 6.5–6.9 million in the United States alone (3). These rates are expected to increase in the future. For example, in the United States, the prevalence of HF has been projected to increase by 46% between 2012 and 2030, leading to more than 8 million adults being affected (4). Like many other developing countries, Saudi Arabia also has an alarming prevalence of HF. The extrapolated prevalence of HF is 455,222 cases with 37,935 new cases annually in Saudi Arabia (5). According to McDonagh, Metra (6), in developed states, the prevalence of HF is 1–2% in adults and $\geq 10\%$ in elderly people (aged >70 years). Correspondingly, AlHabeeb, Al-Ayoubi (7) reported that in Saudi Arabia, the average age of individuals with chronic or acute HF was 57–60 years: around 10 years younger than in developed countries. According to Alghamdi, Algarni (8), the direct medical cost per HF patient was \$9,563. Hospitalization costs were the most significant contributor to total spending, followed by medication and diagnostic costs. As the disease progressed, the cost significantly increased, ranging from \$3,671 in class I to \$16,447 in class IV. Therefore, HF is doubtlessly a serious health issue in Saudi Arabia, considering the high rates of morbidity and mortality reported by the WHO in developing countries.

A variety of different pharmacological and non-pharmacological methods of treatment have been established to treat the involved cardiac disorder and prevent hospitalization and death. Acute decompensated HF (ADHF) is the most common form, responsible for around 80% of hospitalizations of HF patients. ADHF usually occurs due to non-compliance with dietary or medication instructions, dysrhythmia or arrhythmia, Chronic Obstructive Pulmonary Disease (COPD) exacerbation, uncontrolled hypertension, excessive alcohol use, pregnancy, thyroid conditions, and some iatrogenic conditions such as the use of steroids or non-steroidal anti-inflammatory drugs or postoperative fluid replacement. All of these can lead directly or indirectly to progression of the underlying disease (9)

Patients' knowledge about self-care is an important determinant of outcomes. A thorough understanding of self-care is needed to make decisions and act efficiently while performing different self-care activities. Tawalbeh (10) reported that patients' knowledge of HF was the most crucial factor positively influencing HF self-care: those with a better understanding of HF had better self-care adherence compared to those with poor HF knowledge. Therefore, self-care education teaches patients about monitoring different symptoms and signs of volume overload, medication adherence, checking weight regularly, adherence to instructions about diet and fluid intake, structured exercise plans, and the importance of regular clinical visits. Acquiring an adequate level of current information permits patients to make efficient decisions relating

to lifestyle changes and disease management. Hospitalized patients must also be given this information before their discharge (11).

Self-care is a significant part of non-pharmacological HF management because it includes important behaviors that have been proven to improve clinical outcomes (12). Because HF patients need to adhere to multi-component treatment regimens, non-adherence to different self-care guidelines has become a serious health issue. Accordingly, patients' self-care plays a crucial role in the secondary management of HF. According to Jaarsma, Hill (13), HF patients' outcomes are positively affected by adherence to self-care, as indicated by reduced hospitalizations and mortality rates and improved quality of life for these individuals.

Therefore, reducing the hospitalization rates and healthcare costs associated with HF is only possible with strict adherence to self-care guidelines. According to Giezeman, Arne (14), the hospital readmission outcomes of patients with HF depended on their adherence to the crucial guidelines within primary care units. Additionally, Toukhsati, Jaarsma (15) reported that more than half of HF-related readmissions were preventable and most were due to non-adherence to the HF care plan.

Previous studies have indicated that patients' knowledge and self-care can be substantially improved through effective support from their healthcare team and education programs. However, some studies have highlighted issues and challenges in improving disease knowledge and self-care adherence among HF patients. These challenges are more intense for HF patients for many reasons. For instance, Currie, Strachan (16) reported that the majority of HF patients were elderly and many were not educated. Thus, educating this group of patients may be challenging. The study aimed to assess the relationship between disease knowledge and self-care adherence among HF patients at King Abdulaziz University Hospital (KAUH).

METHOD

Research Design

A descriptive cross-sectional design was used to assess the relationship between disease knowledge and self-care adherence among HF patients at King Abdulaziz University Hospital (KAUH).

Setting

The study was carried at the HF outpatient clinic at KAUH because it is the largest and main teaching hospital in Jeddah City. KAUH has more than 200 clinics, including general and specialized clinics such as the cardiology clinic, HF clinic, specialized surgery, internal medicine, endocrinology, dermatology, hematology, orthopedics, ophthalmology, pediatrics, and obstetrics and gynecology. The HF outpatient clinic is led by an HF cardiology consultant, with assistance from other staff members such as a qualified nurse, clinical pharmacists, physician assistants, and a nurse coordinator. Participants were recruited from heart failure outpatient clinics at KAUH from January 31 – May 17, 2021

Participants

A convenience sampling technique was used in this study to select the participants. Convenience sampling is one type of non-probability sampling that uses the most readily available or convenient group of people. It is the most used sampling method in research for

nursing and other disciplines (17). Convenience sampling tends to be favored among students because it is an inexpensive and easy option compared to other techniques. It helps to overcome many of the limitations associated with research (18).

In the current study, the target population was HF patients in follow-up at the cardiology clinic. The inclusion criteria were patients who were aged 18 years or above, had been diagnosed with HF, were taking medication, and had at least a one-month follow-up before the commencement of the study. Patients who were dependent on family members or caregivers were excluded from the study.

Sample Size

Polit and Beck (2018) define a population as the entire interest group, whereas a sample is a subset of the population selected to participate in a study. In this study, the sample consisted of 208 HF patients, based on the total population of 450 HF patients who were in follow-up at the cardiology clinic. The sample size was calculated using Raosoft software, with a 5% margin of error and 95% confidence level.

Outcome Measure

Socio-Demographic Data:

The study collected sociodemographic data from the study participants, including age, sex, income, education level, employment, marital status, duration of disease, and number of hospital admissions

The Dutch Heart Failure Scale (DHFKS) Scale:

The DHFKS was used to assess HF patients' disease knowledge. The scale was developed by van der Wal, Jaarsma (19). It consists of 15 multiple-choice questions on general knowledge of HF (four items: Q6, Q7, Q9, and Q11), knowledge of HF treatment (six items: Q3, Q4, Q10, Q12, Q13, and Q15), and knowledge of HF symptoms and symptom recognition (five items: Q1, Q2, Q5, Q8, and Q14). The participants were asked to select the correct answer from three choices. Every correct answer was given one point, and wrong answers were given zero. Patients' level of knowledge score was determined by the number of correct answers given. The minimum total score was 0 (no knowledge), and the maximum score was 15 (optimal knowledge). This total score for all items was used in the analysis. In this study, adequate knowledge was represented by HF patients scoring at or above the median (≥ 9), whereas inadequate knowledge was represented by those scoring below the median (< 9). The Arabic version of the scale was tested in previous studies and found valid and reliable, with a Cronbach's alpha of 0.88 (Tawalbeh et al., 2017).

The European Heart Failure Self-Care Behavior Scale (EHFScB-12) Scale:

The scale was developed by Jaarsma et al. (2003). The scale 12-item questionnaire assesses three theoretical aspects of self-care behavior in HF patients: complying with the self-care regimen (daily weighing, fluid restriction, medication adherence, low-sodium diet, and flu vaccinations), adapting activities (rest and physical activity), and contacting healthcare providers in case of symptoms of HF decompensation (shortness of breath, increased fatigue, lower limb swelling, or weight gain over a period). For each of the 12 items, patients rate their self-care behavior on a 5-point Likert scale, with 5 denoting "I completely agree" and 1 denoting "I do not agree at all." The rating scale was modified and reversed by the researcher for

participants to specify their adherence level as always or daily = 5, frequently = 4, sometimes = 3, rarely = 2, or never = 1. The minimum total score was 12, with a maximum of 60 points. The higher the score, the good the self-care behavior. The primary analysis was based on the overall self-care scores. In this study, good adherence was represented by HF patients scoring at or above the median (≥ 29), whereas poor adherence was represented by those scoring less than the median (< 29). The validity of the EHFScB-12 as determined by the original author showed a Cronbach's alpha of .77. (Jaarsma et al., 2009).

Ethical Consideration

The study obtained ethical approval from the Scientific Research Committee at (248/2022). All the study participants provided informed consent regarding their voluntary nature of the participation. Participants were assured that their information kept confidential.

Data Analysis

Descriptive statistics were calculated for sociodemographic characteristics and the main study outcomes. Percentages of responses were calculated according to the number of respondents per response, with respect to the number of total responses to a question. The scores from the main study variable subscales were expressed as mean and standard deviation. Moreover, Chi-square test was used to calculate the association between the study main outcomes and sociodemographic data. Furthermore, the Pearson correlation tests were used to examine the relationship between the sociodemographic data and the main study outcomes. All tests were two-tailed, with a significance level of $p < 0.05$. Statistical analysis was performed using SPSS Statistic 26.0.

RESULTS

Sociodemographic Characteristics of the Study Participants

The participants' characteristics are summarized in Table 1; The participants' sociodemographic and clinical characteristics are presented in table. A total of 208 patients participated in this the study. The mean age of the participants was 61.34 ± 13.50 , 49% were in the age group of 50 to less than 70 years old. Out of 208 HF patients, 63.9% were male and 85.6% were married. With regards to the level of education, 64 patients were low educated. 30.8% of the participants were illiterate, 21.6% had a bachelor's degree and the same for secondary school, while 13.9% had primary school, and only 12% of the participants had intermediate school. In addition, 85.1% of the participants were unemployed, and 67.8% of them had a satisfactory income as they reported. The mean duration of the disease was 6.32 ± 7.43 , 59.1% of the participants had between one and less than six years of disease duration. In terms of the number of hospital admissions, the mean number of hospital admissions was 2.00 ± 2.77 , and 24% of the patients had never been hospitalized for HF. Whereas, 76% of the participants had a history of hospitalization for HF; 32.7%, 19.7%, and 23.6% had been hospitalized once, twice, thrice and or times, respectively. Regarding the educational program /lectures about HF, 68.8% of study participants did not attend an educational program.

Table 1: Demographic Characteristics of The Study Participants

Variable	Category	No (%)
Age		Mean $\pm$ SD (61.34$\pm$13.5)
	< 30	3 (1.4%)
	30 - < 50	39 (18.8%)
	50 - < 70	102 (49%)
	≥ 70	64 (30.8%)
Gender	Male	133 (63.9%)
	Female	75 (36.1%)
Marital Status	Married	178 (85.6%)
	Single	11 (5.3%)
	Divorce	6 (2.9%)
	Widow	13 (6.3%)
Level of Education	Illiterate	64 (30.8%)
	Primary School	29 (13.9%)
	Intermediate School	25 (12%)
	Secondary School	45 (21.6%)
	Bachelor	45 (21.6%)
Employment	Employed	31 (14.9%)
	Unemployed	177 (85.1%)
Income (as perceived by patient)	Satisfactory	141 (67.8%)
	Un Satisfactory	67 (32.2%)
Duration of disease		Mean $\pm$ SD (6.32$\pm$7.43)
	<1 year	14 (6.7%)
	1-< 6years	123 (59.1%)
	6-<10 years	43 (20.7%)
	≥ 10 years	28 (13.5%)
Numbers of hospitalization		Mean $\pm$ SD (2.00$\pm$2.77)
	None	50 (24%)
	Once	68 (32.7%)
	Twice	41 (19.7%)
	Three time or more	49 (23.6%)

It was found that 55.8% of the participants had an adequate level of knowledge about HF disease. The mean total HF knowledge score was 8.58 ± 3.08 , with a range from 13 to 15. Level of disease knowledge was further analyzed based on the three thematic areas of the DHFKS. Most of study participants had an adequate HF knowledge in all the two themes of the Dutch HF knowledge scale (DHFKS), specifically the knowledge regarding HF symptoms /symptom recognition, and knowledge of HF treatment 70.7% and 49% respectively. However, only 38.9% of the study participants had adequate knowledge regarding general HF knowledge, as presented in Table 2.

**Table 2: Mean and standard deviation of the Study
Participants' Knowledge Scores Regarding HF(n=208)**

DHFKS Themes	Range	Mean $\pm$ SD
General HF knowledge (0-4)	4	2.14 $\pm$ 0.92
Heart failure symptoms & symptom recognition (0-5)	5	3.09 $\pm$ 1.23
Knowledge of HF treatment (0-6)	5	3.35 $\pm$ 1.44
Total DHFKS Score (0-15)	13	8.58$\pm$3.08

Levels of Disease Knowledge	No (%)
General HF knowledge Adequate Inadequate	81 (38.9%) 127 (61.1%)
Knowledge of HF symptoms & symptom recognition Adequate Inadequate	147 (70.7%) 61 (29.3%)
Knowledge of HF treatment Adequate Inadequate	102 (49%) 106 (51%)

Concerning general HF knowledge, it was observed from the table below that 194 (93.3%) study Participants correctly answered the questions related to the function of the heart. while only 25(12%) of study participants answered the question regarding the cause of rapid worsening of heart failure symptoms correctly. knowledge of HF symptoms and symptom recognition: the question regarding how often severe HF patients should weigh themselves, only 35 (16.8%) of study participants knew that it was important to weigh daily. whereas 191 (91.8%) of the study participants knew that the accumulation of fluid in the legs is the reason behind the swelling of the legs when they have heart failure. knowledge of HF treatment: regarding the important of taking HF medication regularly 205 (98.6%) of study Participants correctly answered these questions. While, only 40(19.23%) of them respond correctly on the best thing to do in case of thirst., as presented in Table 3

Table 3: Frequency of Study Participants' correct answer on each item of the HF knowledge questionnaire (n = 208)

DHFKS Themes	Questions	Correct Answer No (%)
HF general knowledge	What is the function of the heart?	194 (93.3%)
	What does heart failure mean?	120 (57.7%)
	What are the main causes of heart failure?	106 (51%)
	What can cause a rapid worsening of heart failure symptoms?	25 (12%)
Knowledge of HF symptoms & symptom recognition	How often should patients with severe heart failure weigh themselves?	35 (16.8%)
	Why is it important that patients with heart failure should weigh themselves regularly?	119 (57.2%)
	What is the best thing to do in case of increased shortness of breath or swollen legs?	177 (85.1%)
	Why can the legs swell up when you have heart failure?	191 (91.8%)
	Which statement about weight increase and heart failure is true?	121 (58.2%)
Knowledge of HF treatment	How much fluid are you allowed to take at home each day?	110 (52.9%)
	Which of these statements about the medicine is true?	205 (98.6%)
	Why should someone with heart failure follow a low salt diet?	112 (53.8%)
	Which statement about exercise for people with heart failure is true?	84 (40.4%)
	Why are water pills prescribed to someone with heart failure?	146 (70.2%)
	What is the best thing to do when you are thirsty?	40 (19.23%)

Analysis of level self-care adherence based on the three domains of the Modified European Heart Failure Self Care Behavior scale (EHFSCBS) was performed. As shown in the table 4.4.6, 85.5% of the study participants had good level of self-care adherence in the domain focusing on contacting health care providers. Followed by domain of complying with the HF regimen 75.5%. While only 41.8% of study participants had good level of self-care adherence in the domain concerning adapting activities, a higher level of good adherence was noted for taking prescribed medication 191(91.8%) of study participants reported that they always take the prescribed medication. However, 103 (49.5%) of study Participants had poor adherence to yearly flu vaccines followed by daily weight monitoring 86 (41.3%), regular exercise 61 (29.3%) and fluid restriction 47 (22.6%). as presented in Table 4.

Table 4: Mean and standard deviation of Study Participants' HF Self Care adherence Scores(n=208)

EHFSCBs Domain	Range	Mean ± SD
Compliance with the heart failure self-care regimen (5-25)	17	14.06±3.37
Adapting activity (2-10)	6	5.65±1.60
Contacting health care providers (5-25)	13	9.25±2.30
Total DHFKS Score (12-60)	28	28.96±5.1

Study Participants' levels of Heart Failure Self Care adherence (n=208)

EHFSCBs Domain	N (%)
Compliance with the HF Self-care regimen GoodPoor	157(75.5%) 51(24.5%)
Adapting activity GoodPoor	87(41.8%) 121(58.2%)
Contacting health care providers GoodPoor	180(85.5%) 28(13.5%)

Frequency Distribution of self-care adherence Of HF Patients (n=208)

Statement	5	4	3	2	1	Mean ±SD
1weigh myself everyday	12	15	34	61	86	3.93±1.18
	5.8%	7.2%	16.3%	29.3%	41.3%	
If I get shortness of breath, I take it easy	90	65	38	13	2	1.81±0.97
	43.3%	31.3%	18.3%	6.3%	1%	
If shortness of breath increases, I contact my doctor or nurse	99	92	11	4	2	1.64±0.75
	47.6%	44.2%	5.3%	1.9%	1.0%	
If leg/feet are more swollen, I contact mydoctor or nurse	134	48	19	4	3	1.53±0.85
	64.4%	23.1%	9.1%	1.9%	1.4%	
If I gain weight 2 kilograms in a week, I contact my doctor or Nurse	70	79	28	18	13	2.16±1.17
	33.7%	38%	13.5%	8.7%	6.3%	
I limit the amount of fluids I take (not more than 1.5 to 2 litter/day)	41	41	42	47	37	2.99±1.39
	19.7%	19.7%	20.2%	22.6%	17.8%	
I take a rest during the Day	48	100	50	9	1	2.11±0.82
	23.1%	48.1%	24%	4.3%	.5%	
If I experience fatigue, I contact my doctor or nurse	48	106	40	12	2	2.11±0.86
	23.1%	51%	19.2 %	5.8%	1.0%	
I eat a low salt diet	107	24	32	25	20	2.17±1.41
	51.4%	11.5 %	15.4 %	12%	9.6%	
I take my medication as	191	13	3	1	0	1.11±0.39

Prescribed	91.8%	6.3%	1.4%	0.5%	0	
I get a flu shot every Year	26	16	21	42	103	3.87±1.42
	12.5%	7.7%	10.1%	20.2%	49.5%	
I exercise regularly	19	27	46	55	61	3.54±1.28
	9.1%	13%	22.1%	26.4%	29.3%	

Pearson correlation (r) test showed that there was a statistically significant moderate positive correlation between disease knowledge and self-care adherence ($r = .40$, $p < .001$). That means, when the patients had a high score of HF knowledge, they had high score of self-care which indicate good level of self-care adherence. The results of the correlational analysis are presented in table 5.

Table 5: Correlation between Diseases knowledge and self-care adherence among study participants(n=208)

Variables		Disease knowledge Score
Self-Care Adherence Score	Pearson correlation (r)	.40
	Sig. p-value	.001*

* $P \leq .001$ very high significant

The Chi-square (X^2) test was used to explore the relationship between the level of disease knowledge and socio-demographic characteristics. The level of disease knowledge showed no relationship with duration of disease, number of hospitalizations, and receiving education program \lecture ($p > .05$), whereas there was a significant relationship between levels of disease knowledge and patients' age, gender, marital status, employment, income, and educational level. There was a highly significant relationship between patients' gender and their level of disease knowledge ($X^2 = 8.16$, $p \leq .01 = .004$), with 63.2% of male patients having a high level of knowledge. There was a highly significant relationship between patients' age and level of disease knowledge ($X^2 = 11.74$, $p \leq .01 = .008$), with the higher level of knowledge among the age group between 30 and 50 years old. Moreover, there was a significant relationship between patient's marital status and level of disease knowledge ($X^2 = 8.81$, $p \leq .05 = .03$), 81.8% of singles had higher level of knowledge than other marital status. There was a highly significant relationship between patients' employment and their level of disease knowledge ($X^2 = 34.98$, $p \leq .01 = .009$), with a higher level of knowledge among the working group (77.4%). There was a significant relationship between patients' income and their level of disease knowledge ($X^2 = 4.48$, $p \leq .05 = .028$) with 61% of patients who had a satisfactory income also having a high level of knowledge. There was a very highly significant relationship between patients' educational level and disease knowledge level ($X^2 = 34.98$, $p \leq .001$). 77.8% of the bachelor group had a higher level of knowledge than the other educational levels, while the illiterate showed the lowest level of disease knowledge, as described in Table 6.

Table 6 Relation between levels of Disease knowledge and Sociodemographic Characteristics(n=208).

Variables		levels of Disease knowledge		χ^2	Sig.(p value)
		High	Low		
Gender	Male	84 (63.2%)	49 (36.8%)	8.16**	.004
	Female	32 (42.7%)	43 (57.3%)		
Age	< 30	2 (66.7%)	1 (33.3%)	11.74**	.008
	30 - < 50	29 (74.4%)	10 (25.6%)		
	50 - < 70	59 (57.8%)	43 (42.2%)		
	≥70	26 (40.6%)	38 (59.4%)		
Marital status	Married	101 (56.7%)	77 (43.3%)	8.81*	.032
	Single	9 (81.8%)	2 (18.2%)		
	Widow	3 (23.1%)	10 (76.9%)		
	Illiterate	21 (32.8%)	43 (67.2%)	34.98** *	.001
	Primary school	10 (34.5%)	19 (65.5%)		
Educational level	Intermediate school	17 (68%)	8 (32%)		
	Secondary school	33 (73.3%)	12 (26.7%)		
	Bachelor	35 (77.8%)	10 (22.2%)		
Employment	Working	24 (77.4%)	7 (22.6%)	6.92**	.009
	Not working	92 (52%)	85 (48%)		
Income (as perceived by patient)	Satisfactory	86 (61%)	55 (39%)	4.84*	.028
	Unsatisfactory	30 (44.8%)	37 (55.2%)		
	<1 year	9 (64.3%)	5 (35.7%)	3.219	.359
Duration of disease	1-<6 Years	71 (57.7%)	52 (42.3%)		
	6-<10 Years	19 (44.2%)	24 (55.8%)		
	≥10 Years	17 (60.7%)	11 (39.3%)		
	None	30 (60%)	20 (40%)	3.279	.351
Numbers of hospital admissions	Once time	42 (61.8%)	26 (38.2%)		
	Twice times	19 (49.3%)	22 (53.7%)		
	Three times and more	25 (51%)	24 (49%)		
Did you	Yes	39 (60.0%)	26 (40.0%)	.686	.408

receive education programs/lectures about the heart failure or its management ?	No	77 (53.8%)	66 (46.2%)		
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*p≤ .05; **p≤ .01; ***p≤ .001, ns=not significant

Table 7 Relation between levels of Self-care adherence and \ Sociodemographic Characteristics(n=208)

Variables		Self-Care adherence		χ^2	<i>Sig.(p value)</i>
		Good	Poor		
Gender	Male	80 (60.2%)	53 (39.8%)	1.301	.254
	Female	39 (52%)	36 (48%)		
Age	< 30	1 (33.3%)	2 (66.75%)	1.146	.766
	30 - < 50	22 (56.4%)	17 (43.6%)		
	50 - < 70	57 (55.9%)	45 (44.1%)		
	≥70	39 (60.9%)	25 (39.1%)		
Marital status	Married	103 (57.9%)	75 (42.1%)	1.560	.669
	Single	6 (54.5%)	5 (45.5%)		
	Divorced	2 (33.3%)	4 (66.7%)		
	Widow	8 (61.5%)	5 (38.5%)		
Educational level	Illiterate	34 (53.1%)	30 (46.9%)	5.590	.232
	Primary school	12 (41.4%)	17 (58.6%)		
	Intermediate school	15 (60%)	10 (40%)		
	Secondary school	28 (52.2%)	17 (37.8%)		
Employment	Bachelor	30 (66.7%)	15 (33.3%)		
	Working	20 (64.5%)	11 (35.5%)	.794	.373
	Not working	99 (55.9%)	78 (44.1%)		

*p≤ .05; **p≤ .01; ***p≤ .001, ns=not significant

DISCUSSION

Nearly two thirds of the study participants had a good level of self-care adherence. The mean total score for self-care adherence was 28.97 ± 5.61 out of the maximum of 60, with a range of 28. A possible explanation for this is that the participants in this study were stable and ambulatory, so self-care adherence could be improved in this situation. In addition, the participants understood some aspects of this chronic condition and had sufficient knowledge about their treatment regimen. These findings are consistent with the results of a study conducted in Germany by Peters-Klimm, Freund (20), who used the same scale (EHFScB-12) to

identify potential predictors of self-care among 318 outpatients with stable systolic HF. They found that the mean score was 24.7 ± 7.8 , reflecting a good level of self-care adherence.

The current study findings are inconsistent with those of Ling, Jiao (21), who examined self-care behavior, diet, and medication adherence among 107 HF patients in Singapore. They found poor adherence to self-care behaviors, with a mean EHFScB-12 score of 33.2 ± 5.51 . Similarly, Tegegn, Hussien (22) assessed the self-care adherence and related factors among 369 outpatients with HF by using a revised HF compliance questionnaire and found that only 111 (28%) Ethiopian patients had overall good self-care adherence. Also, in contrast to the present findings, a study by Ng'ang'a-Oginga (23) to assess HF self-care behavior and knowledge among 307 HF patients at Kenyatta National Hospital and investigate associations between these reported that half (50.8%) of the participants had poor adherence to self-care behavior. Beker et al. (2014) identified indicators of self-care adherence among 255 Ethiopian patients with chronic HF and discovered that more than half (151; 59.2%) had poor adherence to self-care behavior, with a mean EHFScB-12 score of 31.74 ± 5.85 . Likewise, Ok and Choi (24) assessed adherence to self-care behaviors and HF knowledge among 280 Korean patients with HF. They reported low adherence to self-care, with a total mean score of 31.98 ± 6.81 . Additionally, the present study findings are inconsistent with those of a study conducted in Iran by Kamrani, Foroughan (25) to assess the self-care behaviors and associated factors among 184 chronic HF patients. They showed that the mean self-care score was 31.86 ± 8.09 (minimum 13 and maximum 54).

This finding is inconsistent with those of Ng'ang'a-Oginga (2016), who reported that of the three major domains of the EHFScB-12, the majority (58.6%) of participants had low levels of adherence to self-care regimens, 38.4% had low levels of adherence regarding contacting healthcare providers, and 37.5% had low levels of adherence in relating to adapting activities. Additionally, poor self-care behaviors were evident in a study by Liu et al. (2014). They reported that among the three domains of self-care behaviors, healthy behaviors were identified as having the best compliance. Patients' compliance with symptom management and seeking medical help when experiencing symptom exacerbation were identified as the worst and second worst, respectively.

The current study's analysis of each item of the EHFScB-12 found good adherence to taking prescribed medication (91%) and the low-salt diet (51%). Poor adherence was found with yearly flu vaccines (49.5%), daily weight monitoring (41.3%), regular exercise (29.3%), and fluid restriction (22.6%). In accordance with the present results, a study by Kamrani et al. (2014) revealed that behaviors the performed well by the greatest percentage of participants were taking medication as prescribed (94.6%) and adherence to a low-salt diet (83%). The most common poorly performed behaviors were related to exercise (96.2%), receiving a flu shot (89 %), and weight monitoring (80.5%). The findings of the current study are consistent with those of a study conducted in Vietnam by Sen, Linh (26) to investigate the compliance with treatment among 112 HF patients using the Revised Heart Failure Compliance Scale. It reported that compliance with medication and routine checkups were high (>80%), whereas compliance with exercise, fluid restriction, and daily weighing was low (43.8%, 33.8%, and 16.1%, respectively).

In accordance with the present results, previous studies have revealed that knowledge was significantly associated with self-care behavior. Liu et al. (2014) found that disease knowledge was significantly correlated with self-care behaviors, which indicates that more understanding about HF improved self-care behaviors. These results are also in line with those reported by Sewagegn, Fekadu (27), who found a significant relationship between the mean total knowledge score and the mean total self-care behavior score.

Likewise, a study conducted in Vietnam by Huyen, Jullamate (28) examined the level of self-care behaviors and explored the relationship between self-care behavior and HF knowledge in older adults among 126 patients with HF. It found that HF knowledge correlated with self-care behavior. Additionally, a study by Tegegn et al. (2021) found that the level of knowledge was significantly associated with self-care adherence. HF patients who had adequate knowledge were 3.6 times more adherent to self-care than patients with inadequate knowledge. According to Goodman et al. (2013), HF patients who are more knowledgeable about their disease are more likely to maintain good self-care adherence. Likewise, the results of the current study are supported by those of previous studies that found that disease knowledge is a significant factor that impacts the self-care adherence of HF patients (Dennison et al., 2011; Jackson & Emery, 2011).

The current study found that participants' age correlated with their level of disease knowledge, with 74.4% of those aged between 30 and 50 years having a higher level of knowledge than other age groups. A possible explanation for this might be that older patients have gained knowledge from experience with the disease. In contrast, Róin et al. (2019) and Lee et al. (2015) showed that older age was associated with a lower level of disease knowledge. Furthermore, a study by Razazi et al. (2018) found a significant relationship between the level of HF knowledge and patient age, with the older age group associated with a lower level of knowledge.

The present study's findings are supported by those of previous studies in several countries. A study in the Faroe Islands by Róin, Á Lakjuni (29) found that gender, age, and education level were not correlated with self-care. A study in Vietnam by Huyen et al. (2011) found no significant relationships of gender, income, or education level with self-care behaviors. In Iran, a study by Kamrani et al. (2014) showed no significant relationship of education level or gender with self-care behaviors. In the Netherlands, a study by Gallagher et al. (2011) showed that age, gender, and education level were not correlated with self-care behavior.

In contrast to the present findings, Sedlar, Lainscak (30) found a significant relationship between patient characteristics (age, gender, and education) and HF self-care. A Jordanian study by Tawalbeh et al. (2017) showed that sociodemographic characteristics such as income, age, and education level contributed significantly to poor self-care levels. Similarly, in Vietnam, a study by Sen et al. (2020) found that gender and education level were significantly correlated with treatment adherence. However, age, marital status, and income showed no relation with treatment adherence, consistent with the current study findings.

This study has some limitations. First, due to its cross-sectional design, testing for a cause-effect relationship is difficult. Additionally, sampling bias may come from convenience sampling, and the study population was not representative of all HF patients. The most significant limitation is that the study sample was recruited only from a single hospital (KAUH), so the

generalizability of the study's findings may be limited. Another limitation is that HF knowledge and self-care were assessed using self-reported questionnaires as the primary source of data. Hence, some patients may have given inexact answers, introducing recall bias. Self-reported questionnaires can also be subjective and result in social desirability bias. Adherence to self-care such as dietary sodium intake restrictions, exercise, and medication compliance might have been over-reported. The actual self-care adherence is likely to be lower than self-reported. Despite these limitations, one of the significant strengths of this study is that it is one of the few in Saudi Arabia to address the relationship between HF knowledge and self-care adherence. Additionally, the tools used to assess patients' knowledge and self-care adherence are validated and in wide use, allowing comparison of the results to those presented in various studies.

CONCLUSION

The HF patients' level of self-care adherence was good. Higher adherence was found to taking prescribed medication, and poor adherence existed to yearly flu vaccines, daily weight monitoring, regular exercise, and fluid restriction. This study has shown a relationship between disease knowledge and self-care adherence, which means that a high level of HF knowledge was associated with improved self-care adherence. Relationships were also found between the level of disease knowledge and gender, age, education level, income, and marital status. However, no relationship existed between self-care adherence and age, gender, marital status, education level, employment, income, duration of disease, or hospitalization.

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Data Availability Statement:

The study authors acknowledge that the data are available upon request

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