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Original article

Knowledge, treatment adherence, and quality of life of heart failure patients at Nhan Dan Gia Dinh Hospital

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Abstract: ***Introduction:*** Heart failure (HF) is one of the most common diseases worldwide, with a high prevalence and mortality, creating a significant cost burden on patients, society, and the healthcare system. As a result, extensive research has been conducted to investigate advanced treatment methods for heart failure, and patient adherence plays a crucial role in optimizing treatment effectiveness. This study aims to describe the current status of patients' knowledge, treatment adherence, and quality of life among outpatients with heart failure visiting for routine treatment at Nhan Dan Gia Dinh Hospital. ***Methods:*** A descriptive cross-sectional survey was conducted on 330 outpatients with heart failure who were visited for routine treatment at Nhan Dan Gia Dinh Hospital. All data were collected through face-to-face interviews using constructed questionnaires. ***Results:*** The study showed the limit of heart failure knowledge among patients, with a mean score of 5.2 ± 2.3. Only 4.8% of patients were adequate overall heart failure knowledge. The treatment adherence was limited, with an overall adherence rate of 20.9%. The patient's quality of life was generally stable at a high level, with a mean of 0.871 for the descriptive system score and 0.697 for the standardized VAS score. ***Conclusion:*** The adherence rate of patients with HF was low, particularly among those with non-drug adherence. Very few patients with heart failure have adequate knowledge of heart failure. More support and health education programs on heart failure treatment adherence are needed for patients to increase their knowledge, adherence and improve their quality of life.

Keywords: Heart failure, treatment adherence, quality of life, Nhan Dan Gia Dinh Hospital

1. INTRODUCTION

Heart failure is a condition in which the heart cannot pump sufficient blood and oxygen to supply other organs. It occurs when the heart function is abnormal [1]. Heart failure is the leading cause of disease burden and cardiovascular death in many countries worldwide [2]. The number of patients with heart failure all over the world is approximately 23 million [3]. In Vietnam, an estimation showed that the number of patients with heart failure may range from 320.000 to 1.6 million people according to the global incidence of this disease [4].

Poor treatment adherence in patients with heart failure contributed to the increase in mortality, readmission, and healthcare costs [5]. Patients' adherence to treatment is an important factor for achieving treatment effectiveness.

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However, many studies have shown that the adherence rate of patients with heart failure remains low. In a study conducted by Monica et al. in 2019, poor medication adherence among Brazilians was 59.9% [6]. In Ethiopia (2021), 47.3% of patients did not follow a low-sodium diet, and 52.7% of patients did not limit excess fluid intake [7]. In Vietnam, some studies reported slightly low treatment adherence in heart failure patients [8, 9]. The research conducted by Sen HTN et al. in 2019 at the Cardiology Department, C Hospital showed that 45.5% of participants had poor adherence to treatment, including non-medication treatment at nearly 20%, and the rates of non-adherence to exercise, limiting excess fluid intake, and daily weight were 56.2%, 66.2%, and 93.9%, respectively [8].

Heart failure also has many impacts on patients' lives, including fatigue, reduced sleep quality, depression, and reduced ability to participate in normal social activities. These are potential causes of negative changes in the daily lives of patients with heart failure. Heart failure can reduce the quality of life and lead to increased healthcare costs [10]. It also has a negative impact on health-related quality of life [11]. Hossein's Pender health promotion model showed that it has an impact on the quality of life among patients with heart failure ($p<0.05$) [12].

Treatment adherence can prevent or delay the progression of heart failure, preventing the occurrence of acute heart failure requiring hospitalization. Therefore, it is important to reduce the number of hospital admissions, alleviate hospital overload, improve patients'' quality of life, prolong life expectancy, and reduce the economic burden on families and society. However, adherence to heart failure treatment poses a major challenge for patients, their family members, and medical staff. Based on the above facts, we conducted this study to describe the current status of patients' knowledge, treatment adherence, and quality of life regarding heart failure at Nhan Dan Gia Dinh Hospital.

2. METHODS

2.1. Study design

The cross-sectional study was conducted from November 2021 to March 2022 at Nhan Dan Gia Dinh Hospital which is a level 1 general hospital in Ho Chi Minh City, Vietnam. The study is the pre-intervention assessment phase of an RCT on patients with HF.

2.2. Section headings

Participants in the study are HF outpatients identified based on an electronic medical record system. In this hospital, heart failure is generally diagnosed based on guide of Vietnam Ministry of Health (no 1857/QĐ-BYT signed on July 05, 2022). Based on electronic medical records, patients diagnosed at least one month before who were aged 18 years and had a permanent address in Ho Chi Minh City were included in the expected list. On the day before treatment schedules, we called to remind each patient to go to routine treatment. When patients visited for treatment, they were conveniently approached and invited to participate in to study. After finishing the routine treatment, patients were conveniently approached, provided the information about the study, and invited to participate. Patients disagreeing with participating in at least one of the RCT phases (pre-intervention assessment, implementation of health education intervention, and post-intervention survey) were excluded. Patients agreed to participate by signing the consent form and then were interviewed. Patients who disagreed to participate or had difficulty in understanding or responding were excluded.

2.3. Study sample size

Treatment adherence is the main outcome of the study. Therefore, the sample size was estimated to describe treatment adherence prevalence.

$$n \geq Z^2_{(1-\alpha/2)} \frac{p\,(1-p)}{d^2}$$

In this formula, α is the type I error (α=0.05); $Z_{(1-\alpha/2)}$ is the Z-score of normal distribution at 1-α/2, ($Z_{(1-\alpha/2)}$ = 1.96); d is the precision of estimation (d=0.05); and p is the expected treatment adherence prevalence reference from a previous study among HF patients in Ho Chi Minh City Heart Institute (p=32%) [9]. The minimum sample size required for the estimation is 335 patients.

2.4. Data collection

The data was collected in the hospital by 20 study staffs who are health care professional. The interviews were based on face-to-face management using a structured questionnaire. All study staff underwent training for patient recruitment, inviting and convincing patients to consent, and interviewing. Before starting the major study, the pilot study on 30 patients was conducted. The pilot result showed the appropriateness of the study protocol, the face validity of the questionnaire, and the interview skills of the study staff.

2.5. Questionnaire and variable definition

The study used a structured questionnaire consisting of four parts including general characteristics, HF knowledge, treatment adherence, and quality of life.

General characteristics consisting of the social-economic characteristic and the health condition include age, gender, ethnicity, education level, condition of using health insurance, living with relatives, time from the first diagnosis to study, time from the first diagnosis to treatment, number of emergency hospitalization, HF classification, overweight/obesity (BMI≥25kg/m^2), and comorbidities from electronic medical records.

The HF knowledge part is The Dutch Heart Failure Knowledge Scale (DHFKS) consisting of 15 three-choice questions (items) divided into three domains including HF in general (4 items), treatment (6 items), and symptom/symptom recognition (5 items) [13]. A patient is given 1 point for each correct answer and 0 point for each wrong answer or missing and the overall score ranges from 0 to 15. We defined adequate knowledge of heart failure (HF) as correctly answering at least two-thirds of the questions in each domain. This means answering 10 or more questions right for the overall scale, 3 or more for the 'HF in general' domain, 4 or more for 'HF treatment', and 4 or more for 'HF

symptom/symptom recognition'. In a previous study, the DHFKS underwent a back-translation method and was adapted for the Vietnamese context. The Vietnamese version is acceptable reliability with Cronbach's alpha of 0.72.[14]

The HF treatment adherence part is the Revised Heart Failure Compliance Scale (RHFCS) consisted of 5 questions (items) about taking medication as prescribed, reducing sodium intake, restricting fluid intake, exercising, daily weighing, and follow-up appointment keeping. Each item was scored by a 5-point Likert scale ranging from 0 to 4 respective never to always compliance (0 = never; 1 = seldom; 2 = half of the time; 3 = mostly; 4 = always). In each item, if a score was either 3 or 4 (indicating a response of 'mostly' or 'always'), we considered that item as adherence. We defined overall adherence as complying with 4 or more items.[15] In the Vietnam context, the scale shows Cronbach's alpha was 0.77 and moderately correlated to HF patients' mental health (r=0.29).[8]

HF patient's quality of life was assessed by EQ-5D-5L v2.1. The scale developed by EuroQol Research Foundation consisted of a descriptive system and a visual analogue scale (VAS). The descriptive system includes five dimensions of mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. This part provides a descriptive profile that can be used to generate a health state value set and identify the health state index (utility score). Health state index generally ranged from less than 0 to 1, with higher scores indicating higher health utility (<0 is worse than dead, 0 is equivalent to death, and 1 is full health). The visual analogue scale (VAS) measures perceived health ranging from 0 to 100 (the worst to the best imaginable health). The advantages of the EQ-5D-5L are cognitively undemanding, taking only a few minutes to complete, and instructions are included in the questionnaire. A study in Germany showed that EQ-5D-5L is a suitable method for assessing health-related quality of life in heart failure patients. The EQ-5D-5L was adapted and developed a value set for the Vietnam population ranging from -0,5115 to 1.[16] A previous study in Vietnam used EQ-5D-5L to assess the quality of life in heart failure patients.[17]

2.6. Data analysis

Data were analyzed on STATA v16. We used frequency and percentage to describe almost general characteristics (exclude age, which was analyzed using median and interquartile range (IQR)), HF knowledge, and treatment adherence. Quality of life according to EQ-5D-5L was described by the mean and standard deviation. According to the user guide, EQ-5D-5L can be described by mean ± standard deviation regardless of the distribution assumption.[18] The association of social-economic characteristics and health condition with HF knowledge and treatment adherence were tested by Fisher's exact test and with quality of life by ANOVA test (according to the user guide).[18]

3. RESULTS

From November 2021 to March 2022, our study approached and invited 370 HF patients. In this, 40 patients disagreed to participate and were excluded. Three hundred and thirty patients agreed to participate and were included in the analysis. The response rate was 89.8%.

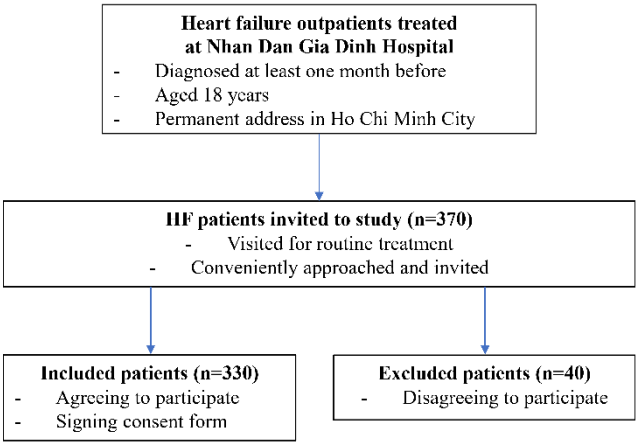

Figure 1. Flowchart of the recruitment process

General characteristics of HF patients

Table 1. General characteristics of patients with heart failure (n=330)

General characteristics of patients with heart failure		
Social-economic characteristics		
Age, *median (IQR)*	63 (55 – 70)	
Age group, *n (%)*		
<50 years old	48	14.6
50-59 years old	81	24.5
≥60 years old	201	60.9
Gender (male), *n (%)*	166	50.3
Ethnicity (Kinh), *n (%)*	323	97.9
Education level, *n (%)*		
Below primary school	35	10.6
Secondary school	81	24.5
High school	161	48.8
Higher than high school	53	16.1
Using health insurance (yes), *n (%)*	328	99.4
Living with relatives (yes), *n (%)*	317	96.1
Health conditions		
NYHA classification of heart failure, *n (%)*		
Class I	189	57.3
Class II	81	24.5
Class III, IV	60	18.2
Time from the first diagnosis to study, n (%)		
1st year	39	11.8

General characteristics of patients with heart failure		
2nd year	114	34.5
3rd or 4th year	89	27.0
5th year or more	88	26.7
Time from first diagnosis to first treatment, *n (%)*		
In the first year	296	89.7
In the second year or farther	34	10.3
Emergency hospitalization in the previous year, *n (%)*		
No	192	58.2
Once	86	26.1
Twice or more	52	15.8
Comorbidities (least one), *n (%)*	303	91.8
Hypertension	244	73.9
Diabetes	78	23.6
Dyslipidemia	165	50.0
Lung disease	22	6.7
Kidney disease	33	10.0
Liver failure	6	1.8
Stomach diseases	55	16.7
Neuropathy	2	0.6
Overweight/Obesity (BMI≥25 kg/m^2), *n (%)*	106	32.5

IQR: Interquartile range; n (%): Frequency (percentage); NYHA: the New York Heart Association; BMI: Body mass index

The results showed that almost (higher than 95%) patients were Kinh, living with relatives and using health insurance. The gender balance between males and females with a gender ratio approximate of 1:1 (50.3% male and 49.7% female). Elderly patients contributed to the most study sample. More than 60% of patients were aged 60 years or higher. The patients were at a high education level consisting of 48.8% finishing high school and 16.1% finishing at a level higher than high school. (Table 1)

Almost patients were at a low NYHA classification of heart failure. About 57.3% were class I, 24.5% were class II, and only 18.2% were more severe than class II. They were diagnosed less than five years ago, and 45.3% were around two years. About 89.7% of patients were treated in the diagnosed year. Comorbidities were common among the patient, with 91.8% having at least one disease. Hypertension was the most common (73.9%), and the next was dyslipidemia (50%) and diabetes (23.6%). (Table 1)

Heart failure knowledge

Table 2. Knowledge about heart failure according to Dutch Heart Failure Knowledge Scales among patients with heart failure (n=330)

Heart failure knowledge (n=330)	Correct answer	
	n	%
Knowledge of heart failure in general		
What can cause a rapid worsening of heart failure symptoms	29	8.8
What does heart failure mean	164	49.7
What is the function of the heart	226	68.5
What are the main causes of heart failure	155	47.0
Adequate heart failure in general knowledge (Correct ≥3 questions)	***72***	***21.8***
Knowledge of heart failure treatment		
How much fluid are you allowed to take at home each day	155	47.0
Which of these statements (about medication) is true	140	42.4
Why should someone with heart failure follow a low-salt diet	45	13.6
Which statement about exercise for people with heart failure is true	105	31.8
Why are water pills prescribed to someone with heart failure	116	35.2
What is the best thing to do when you are thirsty	29	8.8
Adequate heart failure treatment knowledge (Correct ≥ 4 questions)	***21***	***6.4***
Knowledge of heart failure symptoms/symptom recognition		
How often should patients with severe heart failure weigh themselves	62	18.8
Why is it important that patients with heart failure should weigh themselves regularly	128	38.8
What is the best thing to do in case of increased shortness of breath or swollen legs	174	52.7
Why can the legs swell up when you have heart failure	115	34.9
Which statement about weight increase and heart failure is true	67	20.3
Adequate heart failure symptoms/symptom recognition (Correct ≥4 questions)	***27***	***8.2***
Adequate overall heart failure knowledge (*Correct ≥10 questions*)	**16**	**4.8**
Overall heart failure knowledge score	**5.2 ± 2.3**	

The study showed the limit of heart failure knowledge among patients. The mean knowledge score of heart failure was 5.2 ± 2.3. Only 4.8% of patients were adequate overall heart failure knowledge. For three dimensions, general heart failure knowledge was best, however, only adequate in 21.8%

of patients. The knowledge of HF treatment and symptoms/symptom recognition was lacking; less than 10% of patients had adequate knowledge. Some poorest knowledge recognized by items having less than 20% of patients made correct answers were included "What can cause a rapid worsening of heart failure symptoms" (8.8%), "What is the best thing to do when you are thirsty" (8.8%), "Why should someone with heart failure follow a low salt diet" (13.6%), "How often should patients with severe heart failure weigh themselves" (18.8%). (Table 2)

The study found an association between age and education level with HF knowledge. Knowledge of patients less than 50 years old had better than others (p<0.001). A higher education level was related to a higher HF knowledge (p=0.012). (Table 5)

HF treatment adherence

Table 3. Adherence to heart failure treatment according to the Rivesed Heart Failure Compliance scale among patients with heart failure

Adherence to heart failure treatment according to RHFCS (n=330)	**Compliance**	
	n	**%**
Taking medication as prescribed	229	69.4
Reduced sodium intake	140	42.4
Restricted fluid intake	42	12.7
Exercise	92	27.9
Daily weighing	74	22.4
Follow-up appointment keeping	307	93.0
Overall compliance	***69***	***20.9***

Overall adherence was only reached by 20.9% of patients. "The compliance on taking medication as prescribed" and "follow-up appointment keeping" achieved highly compliant (93% and 69.4%, respectively). Behavioral compliance was at a low level with only less than 50% patient compliant for each item. Only 12.7% of patients were compliant with restricted fluid intake and 22.4% were compliant with daily weighing. (Table 3)

Only NYHA HF classification was associated with HF adherence. The compliance rate of NYHA class I is higher than others (p=0.016). (Table 5)

Quality of life

Table 4. Quality of life according to EQ-5D-5L scale among patients with heart failure

Quality of life according to EQ-5D-5L	**Mean ± SD**
Descriptive system overall score (utility score) *(ranging from -0.5115 to 1)*	**0.871 ± 0.227**
VAS score *(ranging from 0 to 100)*	**69.7 ± 12.2**

The patient's quality of life was generally stable at a high level, with the EQ-5D-5L reaching a high score. The means of descriptive system score were 0.871 on the scale ranging from -0.5115 to 1, and of VAS score was 69.7 on a scale ranging from 0 to 1, corresponding to and VAS. (Table 4)

The study did not find the factors associated with the descriptive system score. For the VAS score, higher age was associated with a higher VAS score (p=0.001), and less emergency hospitalization was associated with a higher VAS score (p<0.001). (Table 5)

4. DISCUSSION

Characteristics of heart failure patients

Patients in our study represented many conditions of Heart failure patients as aged and comorbidity. More than 60% of patients were aged 60 years or higher. Almost patients had at least one comorbidity (89.7%). Frequent comorbidities included hypertension was the most common (73.9%), and the next was dyslipidemia (50%) and diabetes (23.6%). These results were similar to many previous studies. Comorbidity prevalence found in the study of Nguyen BT[19] was 100%, and in the study of Zeng W[20] was 89.8%. Hypertension was the most common in HF patients in these studies with 78% in the study of Nguyen BT[19] and 73.9% in the study of Zeng W[20].

Almost patients in our study were at low NYHA classification, were diagnosed less than five years ago and 45.3% were diagnosed around two years. They were treated in the first year of diagnosis. The health condition of HF patients was stable, while only 15.8% were emergency hospitalized twice or more around the previous year. Our patients showed milder heart failure than patients in previous studies. NYHA class III accounted for 65% of patients according to Nguyen BT et.al[19] in 2016, 73.6% according to Le HN et.al.[21] in 2018, and 47.2% according to Dao TP et.al.[22] in 2021. Our results revealed the good capacity for HF diagnosis and management at Nhan Dan Gia Dinh Hospital. Emergency hospitalization was associated with the patient's quality of life. Emergency hospitalization troubles patients and might lead to a low perception of quality of life. Opposite, a bad health condition may lead to emergency hospitalization and a low quality of life. These relationships were found in the previous study with an independent association between quality of life and readmission among heart failure patients.[23,24] The diagnosis and management advantage of Nhan Dan Gia Dinh Hospital should be promoted for the patient's health and quality of life.

Knowledge of heart failure

Our study showed the limit of knowledge among HF patients. The mean overall heart failure knowledge score (DHFKS score) was 5.2 ± 2.3. Only 4.8% of patients were adequate heart failure knowledge. This result was lower than that in previous studies in Vietnam. The mean DHFKS of Vietnamese heart failure patients was 9.2 ± 3.1 according to Hanh NH[25]; 7.7 ± 3 according to Binh CT[26]; 8.7 ± 2 according to Ha TT[27]; and 8.6 ± 2.1 according to Dinh HTT[28]. The adequate overall HF knowledge in our study was 4.8%, lower than 17.2% in the study of Xoan VT[29] and 27.3% in Ha TT[27] Heart failure knowledge in our study was lower than in previous studies in Vietnam might cause some difference in social-economic characteristics and health conditions.

Table 5. The association of general characteristics with HF knowledge, adherence, and quality of life among patients with heart failure (n=330)

	Adequate HF knowledge		HF Compliance		Quality of life (Standardized descriptive system overall score)*		Quality of life (VAS score)	
	n (%)	p	n (%)	p	Mean ± SD	p	Mean ± SD	p
Age group								
<50 years old	8 (16.7)		9 (18.8)		0.902 ± 0.155		73.7 ± 11.2	
50-59 years old	3 (3.7)	<0.001	18 (22.2)	0.925	0.919 ± 0.138	0.821	72.0 ± 11.4	0.001
≥60 years old	5 (2.5)		42 (20.9)		0.915 ± 0.154		67.8 ± 12.5	
Gender								
Male	4 (2.4)	0.070	37 (22.6)	0.500	0.906 ± 0.164	0.303	68.7 ± 13.0	0.176
Female	12 (7.2)		32 (19.3)		0.923 ± 0.135		70.6 ± 11.4	
Ethnicity								
Kinh	16 (4.9)	1.000	69 (21.4)	0.352	0.913 ± 0.151	0.359	69.7 ± 12.2	0.940
Other	0 (0)		0 (0)		0.966 ± 0.090		70.0 ± 14.4	
Education level								
Below primary school	0 (0)		7 (20.0)		0.928 ± 0.179		67.0 ± 15.1	
Secondary school	1 (1.2)	0.012	12 (14.8)	0.449	0.912 ± 0.140	0.953	67.4 ± 13.8	0.057
High school	8 (5.0)		38 (23.6)		0.913 ± 0.147		70.5 ± 10.5	
Above high school	7 (13.2)		12 (22.6)		0.913 ± 0.159		72.2 ± 12.2	
Using health insurance								
Yes	16 (4.9)	1.000	69 (21.0)	1.000	0.914 ± 0.151	0.903	69.6 ± 12.3	0.743
No	0 (0)		0 (0)		0.927 ± 0.103		72.5 ± 10.6	
Living with family								
Yes	16 (5.1)	1.000	65 (20.5)	0.483	0.915 ± 0.151	0.942	69.5 ± 12.0	0.254
No	0 (0)		4 (30.8)		0.911 ± 0.148		73.5 ± 17.2	
Time from the first diagnosis to study								
1st year	3 (7.7)		6 (15.4)		0.923 ± 0.114		66.8 ± 13.0	
2nd year	8 (7.0)	0.289	22 (19.3)	0.254	0.910 ± 0.152	0.196	71.6 ± 11.5	0.100
3rd or 4th year	2 (2.3)		16 (18.0)		0.939 ± 0.115		68.2 ± 11.7	
5th year or more	3 (3.4)		25 (28.4)		0.892 ± 0.188		70.0 ± 13.2	
Time from the first diagnosis to treatment								
In the first year	14 (4.7)	0.674	66 (22.3)	0.076	0.911 ± 0.154	0.171	69.7 ± 12.3	0.719
In the second year or farther	2 (5.9)		3 (8.8)		0.948 ± 0.111		68.9 ± 12.4	

	Adequate HF knowledge		HF Compliance		Quality of life (Standardized descriptive system overall score)*		Quality of life (VAS score)	
	n (%)	p	n (%)	p	Mean ± SD	p	Mean ± SD	p
Emergency hospitalization in the previous year								
No	13 (6.8)	0.240	44 (22.9)	0.604	0.907 ± 0.155	0.507	72.3 ± 12.3	<0.001
Once	2 (2.3)		16 (18.6)		0.920 ± 0.135		66.3 ± 11.6	
Twice or more	1 (1.9)		9 (17.3)		0.933 ± 0.155		65.4 ± 10.6	
HF classification								
Class I	12 (6.4)		50 (26.5)		0.910 ± 0.163		70.2 ± 12.0	
Class II	4 (4.9)	0.103	10 (12.3)	0.016	0.918 ± 0.140	0.851	68.9 ± 12.1	64.8
Class III, IV	0 (0)		9 (15.0)		0.922 ± 0.121		69.0 ± 13.3	
Comorbidities								
Have least one	16 (5.3)	0.380	67 (22.1)	0.085	0.914 ± 0.153	0.741	69.5 ± 12.0	0.439
No	0 (0)		2 (7.4)		0.924 ± 0.122		71.4 ± 14.5	
Overweight/Obesity								
Yes	7 (6,6)	0,412	17 (16.0)	0.147	0.935 ± 0.113	0.088	70.7 ± 13.1	31.0
No	9 (4,1)		52 (23.6)		0.905 ± 0.163		69.2 ± 11.9	

**Standardized descriptive system overall score = (observed value – min)/(max – min)*

Patients in the studies of Dinh HTT[28] and Xoan VT[29] were severer HF, younger, and were diagnosed near than our study. According to Dinh HTT[28], there were 65% at NYHA class III or IV, mean age of 54.4 years old, 46.4% were diagnosed around one year, and 22.1% were diagnosed around three months before. According to Xoan VT[29], 57% of patients at NYHA class II or higher, 51.7% older than 60, and 30% were diagnosed around one year before. Patients having severe conditions or nearer diagnosis might be more impressive to heart failure knowledge than others. Older age might be a barrier to HF knowledge among patients. In our study, education level was associated with HF knowledge with an improvement of HF knowledge by education level (p=0.012). Our study found 64.9% of patients were from high school, that in studies of Dinh HTT[28] and Xoan VT[29] were about 70%. Although our patients had higher education levels than other studies, HF knowledge in our study was lower. HF knowledge is medical knowledge, different and more difficult to master than lived knowledge. The education level is fundamental to health literacy, and health education is needed to promote knowledge in HF patients. In our study, some poorest knowledge should be concerned in health education programs for patients with HF. These items included "What can cause a rapid worsening of heart failure symptoms" (8.8%), "What is the best thing to do when you are thirsty" (8.8%), "Why should someone with heart failure follow a low salt diet" (13.6%), "How often should patients with severe heart failure weigh themselves" (18.8%).

Treatment adherence according to the RHFCS

In our study, the treatment adherence rate of heart failure patients was 20.9%. This was lower than 37% in studies of Nhan LH[21] and 54.5% in Sen HTN[8]. In addition, adherence to medical treatment was high at 75.6%. This was similar to the study of Sen HTN[8] in 2019 at the Department of Cardiology, Hospital C, with more than 80% of patients adhering to medication treatment. This is higher than that reported by Monica et.al.[6] conducted in 2019 in Brazil showed a drug adherence rate of 41.1%. Good adherence to medication helps doctors control the symptoms of heart failure and prevent worsening. In this study, the compliance rate with limiting fluid intake was 12.7%, which was slightly low. Compared to a study conducted by Nieuwenhuis et al., the rate of fluid restriction intake was 72%-89% during 18 months of follow-up[30], which was also reported by Mantovani VN et al. at 40.6% [31], and Phuong DT et al. was 48.4% in 2021[22]. The rate of adherence to a low-salt diet in this study was 42.4%, which is similar to that reported by Nieuwenhuis et al. in 2012 (50%) [30]. Research conducted by Ha Thi Thuy in 2021 showed that 32.2% of patients did not or very little follow a salt-reduced diet, and 65.7% of patients did not order low-salt foods when eating out [27]. In addition, the patient's exercise compliance rate was 33.6%, and the daily weight monitoring compliance

rate was 22.4%, which is higher than the results of Tam NB[19], where only 3.7% of patients always monitored their weight daily and 2.4% of patients adhered to exercise treatment. Adherence to non-drug treatment is more complicated than adherence to drug treatment, which may be the main reason for the low adherence to non-drug therapy.

The study results indicate that treatment adherence in heart failure patients was limited, and non-drug compliance is still more complicated than medication adherence, which has also been found in previous studies[19, 22, 32, 30]. This study illustrates the necessary strategies to support and strengthen health education regarding HF treatment adherence in patients. Additional to the limitation of adherence in almost patients, our study found that a severer NYHA class was associated with less adherence (p=0.016). Therefore, all patients should be centered in support programs, especially patients with NYHA class III. In terms of support programs, calling or sending letters to remind participants to check and take their medications regularly can improve adherence rates. In addition to increasing knowledge about heart failure, drug, and non-drug treatments can improve patients' health and quality of life. In addition, having sufficient knowledge helps patients with better self-care and treatment, preventing or slowing the progression of heart failure, and avoiding acute heart failure, thereby reducing the number of hospitalizations and hospital overload, and reducing the economic burden on families and society at the same time.

Quality of Life

Quality of life is a factor used to evaluate the effectiveness of treatment in patients with HF. Therefore, this should be considered when monitoring patients undergoing outpatient treatment. Based on EQ-5D-5L, our study recognized the high quality of life on the descriptive system score (0.871 ± 0.32) and VAS score (69.7 ± 12.2). The quality of life scale were measured by five dimentions, including walking, self-care, routine activities, pain/discomfort, and anxiety/melancholy that more affected with the severe HF patients. In our study, most of the patients were low-mild severe HF conditions (81.8% in NYHA class I or II), therefore, they are likely less affected by the above five dimensions of the quality of life scale.

This study has several limitations. First, The study design is cross-sectional and aims to describe the knowledge of heart failure, treatment adherence, and quality of life of the HF patients. Therefore the current data are not sufficient to prove the causative association between higher knowledge of HF resulted in higher treatment adherence and hence increased the quality of life. It warrants further study to access the causative association between knowledge of HF, treatment adherence, and quality of life. Second, the study focuses on outpatients at a single center, suggesting the findings might not be universally applicable to other patient demographics with different characteristics compared to our study population. Finally, the EQ-5D-5L is not designed specifically for accessing the quality of life of HF patients; hence future study needs to consider developing a more specific quality of life scale for HF patients.

Conclusion

Heart failure (HF) is a chronic disease that affects the daily life of patients and requires long-term treatment. Treatment adherence is a crucial issue in controlling the patient's health. This study showed that the compliance rate was slightly low, especially for nondrug adherence. Very few patients with heart failure have adequate knowledge of the heart failure condition. More support and health education programs on heart failure treatment adherence are needed for patients to increase their knowledge and improve their quality of life.

LIST OF ABBREVIATIONS

HF: Heart Failure

VAS: Visual Analogue Scale

RCT: Randomized Controlled Trial

BMI: Body Mass Index

DHFKS: The Dutch Heart Failure Knowledge Scale

RHFCS: Revised Heart Failure Compliance Scale

EQ-5D-5L: European Quality of Life 5 Dimensions 5 Level

IQR: Interquartile Range

ANOVA: Analysis of Variance

NYHA: New York Heart Association

SD: Standard Deviation

ETHICAL STATEMENT

The study was approved by the ethics committee of the University of Medicine and Pharmacy at Ho Chi Minh City (No. 980/HDDD-DHYD, signed on December 29, 2020) and Nhan Dan Gia Dinh Hospital (approval number 11/NDGD-HDDD, signed on January 29, 2021). The collected data were encrypted and kept confidential.

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This study only collected data from patients who were interviewed face-to-face using prepared questionnaires. Participants could skip any questions if they felt uncomfortable or did not want to answer them. All data were used for research purposes only and were completely confidential, and the data from the participants were not used for any other purpose.

CONFLICT OF INTEREST

The authors declare that there is no conflict of interest.

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AUTHORS' CONTRIBUTION

All authors made a significant contribution included:

CVH: Ideas, methodology, project administration, data collection, data analysis, result interpretation, writing, response to reviews.

TND: Methodology, data analysis, result interpretation, writing, response to reviews.

DNN: Ideas, methodology, result interpretation, supervision.

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REFERENCES

1. Angehrn W. Medical treatment of heart failure: old facts in new lights. *Schweizerische medizinische Wochenschrif*. 2000;130(1-2):25-27.
2. Schocken D, Benjamin J, Fonarow C, Krumholz M, Levy D. Prevention of heart failure: a scientific statement from the American Heart Association Councils on Epidemiology and Prevention, Clinical Cardiology, Cardiovascular Nursing, and High Blood Pressure Research; Quality of Care and Outcomes Research Interdisciplinary Working Group; and Functional Genomics and Translational Biology Interdisciplinary Working Group. *Circulation*. May 13 2008;117(19):2544-65. doi:10.1161/circulationaha.107.188965
3. Roger V. Epidemiology of heart failure. *Circ Res*. Aug 30 2013;113(6):646-59. doi:10.1161/circresaha.113.300268
4. Reyes B, Ha W, Firdaus I, Ghazi M. Heart failure across Asia: Same healthcare burden but differences in organization of care. *Int J Cardiol*. Nov 15 2016;223:pp. 163-167. doi:10.1016/j.ijcard.2016.07.256
5. Fitzgerald A, Powers D, Ho M, Maddox M. Impact of medication nonadherence on hospitalizations and mortality in heart failure. *J Card Fail*. Aug 2011;17(8):p.666.
6. Oscalices L, Okuno P, Lopes M, Batista A, Campanharo V. Health literacy and adherence to treatment of patients with heart failure. *Rev Esc Enferm USP*. Jul 15 2019;53:e03447. doi:10.1590/s1980-220x2017039803447
7. Baymot A, Gela D, Bedada T. Adherence to self-care recommendations and associated factors among adult heart failure patients in public hospitals, Addis Ababa, Ethiopia, 2021: cross-sectional study. *BMC Cardiovasc Disord*. 2022;22(1):275.
8. Sen HTN, Linh TTT, Trang DTK. Factors related to treatment compliance among patients with heart failure. *Ramathibodi Medical Journal*. 2020;43(2):30-40.
9. Cuong HV, Nguyen ND. Treatment adherence in outpatient heart failure patients at Ho Chi Minh City Heart Institute. *Medical Journal of Ho Chi Minh City*. 2016;20(1):356.
10. Angela B, Christine T, Charlene K. A nurse-led initiative to reduce heart failure hospitalizations by improving patient self-management skills. *Heart & Lung: The Journal of Cardiopulmonary and Acute Care*. 2015;44(6):pp. 553.
11. Gott M, Barnes S, Parker C, et al. Predictors of the quality of life of older people with heart failure recruited from primary care. *Age Ageing*. Mar 2006;35(2):172-7. doi:10.1093/ageing/afj040
12. Habibzadeh H, Shariati A, Mohammadi F, Babayi S. The effect of educational intervention based on Pender's health promotion model on quality of life and health promotion in patients with heart failure: an experimental study. *BMC Cardiovasc Disord*. Oct 5 2021;21(1):478. doi:10.1186/s12872-021-02294-x
13. van der Wal MH, Jaarsma T, van Veldhuisen DJ. Non-compliance in patients with heart failure; how can we manage it? *Eur J Heart Fail*. Jan 2005;7(1):5-17. doi:10.1016/j.ejheart.2004.04.007
14. Nguyen NH, Nguyen TD. Factors related to Self-care Behaviors among Older Adults with Heart Failure in Thai Nguyen General Hospital, Vietnam. *Vietnam Cardiology Journal*. 2013;64:26.
15. Evangelista LS, Berg J, Dracup K. Relationship between psychosocial variables and compliance in patients with heart failure. *Heart Lung*. Jul-Aug 2001;30(4):294-301. doi:10.1067/mhl.2001.116011
16. Mai VQ, Sun S, Minh HV, et al. An EQ-5D-5L Value Set for Vietnam. *Qual Life Res*. Jul 2020;29(7):1923-1933. doi:10.1007/s11136-020-02469-7
17. Tran TML, Do VC. Changes in the quality of life among patients with chronic heart failure after applying diaphragmatic breathing at 108 Military Central Hospital. *Nursing science Journal*. 2022;05(02):144.
18. EuroQol Research Foundation. *EQ-5D-5L user guide: Basic information on how to use the EQ-5D-5L*. EuroQol Research Foundation; 2019.
19. Tam NB. Depression and treatment adherence of heart failure patients at Nam Dinh General Hospital. *Journal of Nursing Science*. 2018;1(1):40 - 46.
20. Zeng W, Chia SY, Chan YH, Tan SC. Factors impacting heart failure patients' knowledge of heart disease and self-care management. *Proceedings of Singapore Healthcare*. 2017;26(1):26 - 34.
21. Nhan LH, Long NT. Survey on depression rate and related factors in heart failure patients being treated at Dong Thap General Hospital. *Vietnamese Medical Journal*. 2022;517(2):117 - 121.
22. Phuong DT, Hue NTN. Survey of knowledge about heart failure in heart failure patients at E hospital, Hanoi in 2021. *Vietnam Medical Journal*. 2021;3(4):129 - 132.
23. Rodríguez-Artalejo F, Guallar-Castillón P, Pascual CR, et al. Health-related quality of life as a predictor of hospital readmission and death among patients with heart failure. *Arch Intern Med*. Jun 13 2005;165(11):1274-9. doi:10.1001/archinte.165.11.1274
24. Lima MA, Duque AP, Rodrigues Junior LF, Lima VC, Trotte LA, Guimaraes TC. Health literacy and quality of life in hospitalized heart failure patients: a cross-sectional study. *Am J Cardiovasc Dis*. 2020;10(4):490-498.
25. Hanh NH. Assessment of self-care practice improvement and effect on treatment oucome of outpatient with heart failure in Trung Uong Quan Doi 108 Hospital. *Journal of 108 - Clinical Medicine and Phamarcy*. 2022;17(2):https://doi.org/10.52389/ydls.v17i2.1167.
26. Cung TB. Self-care and related factors in patients with heart failure. *Y hoc TP Ho Chi Minh* 2017;Vol 21(no 4):p.149.
27. Ha TT, Tuyen NT, Hoai BT. Knowledge and self-care behavior of patients with heart failure. *Vietnamese Medical Journal*. 2021;512(2):tr. 220-224. doi:https://doi.org/10.51298/vmj.v512i2.2311
28. Dinh HTT, Bonner A, Ramsbotham J, Clark R. Cluster randomized controlled trial testing the effectiveness of a self-management intervention using the teach-back method for people with heart failure. *Nurs Health Sci*. Dec 2019;21(4):436-444. doi:10.1111/nhs.12616
29. Xoan VT, Wasana R, Trang HTT. Perceived Benefits and Barriers to Sodium Restriction among Patients with Heart Failure in Vietnam: A Pilot Study Findings. *International Journal of Nursing*. 2020;Vol 7(no 2):92-99.
30. Nieuwenhuis MM, Jaarsma T, van Veldhuisen DJ, Postmus D, van der Wal MH. Long-term compliance with nonpharmacologic treatment of patients with heart failure. *Am J Cardiol*. Aug 1 2012;110(3):392-7. doi:10.1016/j.amjcard.2012.03.039
31. Mantovani V, Ruschel K, Souza E, Mussi C, Rabelo-Silva E. Treatment adherence in patients with heart failure receiving nurse-assisted home visits. *Acta Paul Enferm*. 2015;28(1):7 - 44.
32. Yancy CW, Jessup M, Bozkurt B, et al. 2013 ACCF/AHA guideline for the management of heart failure: a report of the American College of Cardiology Foundation/American Heart Association Task Force on Practice Guidelines. *J Am Coll Cardiol*. Oct 15 2013;62(16):e147-239. doi:10.1016/j.jacc.2013.05.019

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