



# Predictors of Health Status of Patients with Advanced Heart Failure

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## Abstract

**Objective:** The aim of this study was to determine the predictors of health status in patients with advanced heart failure.

**Methods:** The descriptive, cross-sectional, single-center study was conducted with 296 patients between May 2013 and May 2014. Patients' health status was determined using the Kansas City Cardiomyopathy Questionnaire. Sociodemographic and clinical characteristics as well as symptoms were potential predictors. Other predictors were measured with the Mishel's Uncertainty in Illness Scale–Community Form, Coping Style Scale and Multidimensional Scale of Perceived Social Support. The predictors of health status were examined via multiple linear regression analyses which was performed with enter method. Independent variables related to health status were compared using the Student's t test and one way ANOVA.

**Results:** Three health status scores were obtained in the study. The overall health, functional status and clinical total scores were  $59.26 \pm 21.66$ ,  $35.30 \pm 15.01$  and  $52.70 \pm 19.80$ , respectively. Variables included in Models 1, 2 and 3 according to regression analysis accounted for 66.9%, 72.1% and 66.6% of the variance in health status, respectively. In three different regression models, common predictor variables were symptom burden, perceived health status, social support and informants being doctors. Furthermore, illness uncertainty was a predictor variable for functional status.

**Conclusion:** The health status of patients with advanced heart failure was assessed multivariate and includes originality. Through the findings of the study, it can be emphasized that the quality of patient education should be improved and biopsychosocial approach should be featured in health care services in order to achieve better health outcomes.

**Keywords:** Coping with stress; heart failure; predictors of health status; social support; uncertainty.

## İleri Kalp Yetersizliği Olan Hastalarda Sağlık Statüsünün Belirleyicileri

### Özet

**Amaç:** Bu çalışmanın amacı ileri kalp yetersizliği olan hastalarda sağlık statüsünün belirleyicilerini saptamaktır.

**Yöntemler:** Tanımlayıcı, kesitsel ve tek merkezli çalışma Mayıs 2013-Mayıs 2014 arasında kalp yetersizliği olan 296 hasta ile yapıldı. Sağlık statüsü Kansas City Kardiyomiyopati Anketi ile belirlendi. Sosyodemografik, klinik özellikler ve semptomlar potansiyel belirleyiciler olarak düşünüldü. Diğer belirleyiciler Mishel Hastalıkta Belirsizlik Ölçeği-Toplum Formu, Stresle Başa Çıkma Tazları Ölçeği ve Çok Boyutlu Algılanan Sosyal Destek Ölçeği ile ölçüldü. Sağlık statüsünün bağımsız belirleyici değişkenleri enter method ile çalışılan çoklu regresyon analizi ile hesaplandı. Sağlık statüsü ile ilişkili bağımsız değişkenler bağımsız iki örneklem t testi ve tek yönlü varyans analizi ile karşılaştırıldı.

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**Bulgular:** Çalışmada üç sağlık statüsü puanı elde edildi. Hastaların genel sağlık, fonksiyonel durum ve klinik toplam skorları sırasıyla  $59.26 \pm 21.66$ ,  $35.30 \pm 15.01$ ,  $52.70 \pm 19.80$  idi. Regresyon analizine göre Model 1, Model 2 ve Model 3'te yer alan değişkenler sağlık statüsü için varyansın sırasıyla %66.9, %72.1, %66.6'sını açıkladı. Üç farklı regresyon modelinde, ortak belirleyici değişkenler semptom yükü, algılanan sağlık durumu, sosyal destek ve hekimden bilgi almaydı. Hastalık belirsizliği, fonksiyonel durum için belirleyici değişkenlerden biriydi.

**Sonuç:** Bu çalışmada, ileri kalp yetersizliği olan hastalarda sağlık statüsü çok değişkenli olarak değerlendirildi ve özgünlük içermektedir. Çalışma bulguları doğrultusunda, daha iyi sağlık sonuçları elde etmek için hasta eğitimi kalitesinin artırılması ve sağlık bakım hizmetlerinde biyopsikososyal yaklaşımın ön plana çıkarılmasının gerekliliği vurgulanabilir.

**Anahtar sözcükler:** Belirsizlik; sağlık statüsünün belirleyicileri; sosyal destek, stresle başa çıkma; kalp yetersizliği.

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**H**ear failure (HF) is a significant chronic progressive disease in which the heart's pumping ability is impaired.<sup>[1]</sup> Symptoms that develop owing to ventricular dysfunction reduce the health-related quality of life (HRQoL) and shorten the lifespan.<sup>[2]</sup> In addition, the prevalence of HF continues to increase.<sup>[3]</sup> Globally, majority of patients hospitalised owing to HF die within five years following their admission to the hospital.<sup>[1]</sup> As is the case across the world, HF is an important health problem in Turkey as well, with nearly 2.5 million people having been diagnosed with HF.<sup>[4]</sup> It can be said that HF will continue to be a significant public health problem in the future as well.<sup>[5]</sup>

HF limits daily life activities; causes problems in professional life, family or friendships; results in loss of body image; limits social life; and requires adaptation to the process of change.<sup>[6, 7]</sup> Despite intensive medical treatment, these patients are frequently admitted to hospitals owing to acute exacerbations.<sup>[8]</sup> Furthermore, factors such as a long treatment period, lack of knowledge about the disease, incomprehensible explanations regarding the disease process, and uncertain prognosis can lead to psychosocial problems, such as those ranging from anxiety to fear of death, in lives of patients with HF.<sup>[9, 10]</sup> Therefore, the health status of patients with HF is generally poor.<sup>[11]</sup> Results of two previous studies reported that patients with HF have a lower health status than individuals with other chronic diseases.<sup>[11, 12]</sup>

In the literature, New York Heart Association (NYHA) classification,<sup>[13]</sup> functional state,<sup>[14]</sup> anxiety and depression,<sup>[11]</sup> social support,<sup>[14]</sup> coping strategies<sup>[15]</sup> and number of medications taken<sup>[11]</sup> are among the variables that have been shown to be associated with health status in HF patients. Moreover, the previous studies suggest that illness uncertainty is also one of the predictor variables on impaired health status. Although the number of studies on illness uncertainty is limited, results of studies on various heart diseases reported that increased uncertainty is associated with the frequency of symptoms, increased anxiety, low HRQoL, mood disorders, low level of coping

and impaired sense of control over the disease.<sup>[16–19]</sup> On the other hand, Mishel Uncertainty in Illness Theory is one of the theories explaining the illness uncertainty. According to this theory, illness uncertainty occurs as a result of ambiguity associated with the illness, complexity evolving towards treatment and care, lack of information about the diagnosis and seriousness of the disease, and unpredictability in the course of the illness.<sup>[8, 16, 20]</sup> In addition, it includes antecedent concepts such as symptom pattern, event familiarity, event congruence, stress, coping strategies and social support.<sup>[21]</sup> In Turkey, in previous studies on the HRQoL or health status of patients with HF, there are no studies that examined this concept.

Taken together, results of previous studies have indicated that there are various predictors of the health status of patients with HF. It is expected that evaluation of the present study's findings, together with the variables mentioned above, will provide a wider perspective for the assessment of the health status of patients with HF and the variables that predict it. Therefore, the aim of this study was to determine the predictors of health status in Turkish patients with advanced HF.

## Method

### Design

This is a descriptive cross-sectional, single-center study.

### Setting and Patients

This study was conducted in the cardiology clinic of a thoracic and cardiovascular surgery hospital in Turkey between May 2013 and May 2014. The research population was comprised 296 patients diagnosed with advanced HF. Patients were eligible if they had a diagnosis of advanced HF (NYHA class III and IV) and a documented left ventricular ejection fraction (LVEF) of  $\leq 40\%$ . Other eligibility criteria that were included were as follows: being aged  $\geq 18$  years, being able to communicate; not having any psychiatric illness and or have undergone any planned surgery or invasive cardiac procedure.

## Measurements

**General characteristics.** Sociodemographic, clinical and symptomatic data were collected using the patient information form. The patient information form included 26 questions about patients' descriptive characteristics (gender, age, marital status, level of education, profession, working status), clinical characteristics (NYHA class, LVEF, time of diagnosis, hospitalisation frequency, chronic diseases, information about the HF, HF medications) and symptomatic data (dyspnoea, oedema, fatigue, drug compliance, diet, activity limitation).

**Health status.** Patients' health status was determined using the Kansas City Cardiomyopathy Questionnaire (KCCQ). The KCCQ is a 23-item self-administered HRQoL questionnaire including physical limitation, symptom frequency, symptom severity, change over time, quality of life, social interference and self-efficacy subscales. However, to facilitate interpretability, two summary scores were developed including functional status (sum of physical limitation, symptom frequency and symptom severity subscales scores) and a clinical total score (sum of functional status with quality of life and social interference subscales scores.<sup>[22]</sup> Items are scored on a five-, six- or seven-point Likert-type scale. The KCCQ scores range from 0 to 100. As the scores obtained from the scale increase, health status level increases. The Cronbach's alpha coefficient of the original KCCQ is  $\geq 0.78$  except for the social interference subscale. Spertus and Duraoz have made Turkish versions of the KCCQ.<sup>[23]</sup> The results of this study will be calculated and interpreted based on three scores concerning the health status, which include the two summary scores mentioned above and total scale score (overall score). Cronbach's alpha coefficients of our study KCCQ was 0.85.

**Illness uncertainty.** Illness uncertainty was measured by the Mishel's Uncertainty in Illness Scale-Community Form (MUIS-C). The MUIS-C is a 23-item, one-factor and 5-point Likert-type scale.<sup>[24]</sup> The possible uncertainty scores range from 23 to 115, with a mid-range score of 69, and higher the score, greater the uncertainty. The reliabilities for the MUIS-C were in the moderate-to-high range of 0.74–0.92.<sup>[17, 24]</sup> Furthermore, the Turkish version of the MUIS-C was prepared by researchers prior to this study. Cultural adaptation of this form into Turkish included forward and backward translation from the original language into Turkish, content validity, factor analysis and Cronbach's alpha coefficient analysis. The explanatory factor analysis calculated a one-factor structure for 23 items, and the factor loads of all items were over 0.32. The Cronbach's alpha coefficient for

the Turkish scale was 0.64.

**Coping.** Coping with stress was measured by the Coping Style Scale (CSS). The CSS was developed by Şahin and Durak.<sup>[25]</sup> The 30-item scale includes a self-confident approach, helpless approach, optimistic approach, submissive approach and searching for social support subscales. The subscale scores on the four-point Likert-type scale is 0–3. High subscale scores are interpreted as having more use of the coping style associated with that subscale. Cronbach's alpha coefficients of the subscales are 0.53–0.74 for original scale. Cronbach's alpha coefficient of the CSS was 0.71 for this study.

**Perceived social support.** The Multidimensional Scale of Perceived Social Support (MSPSS) was used to measure perceived social support. The MSPSS was developed by Zimet et al.<sup>[26]</sup> and the Turkish version by Eker and Arkar.<sup>[27]</sup> The 12-item and seven-point Likert-type scale includes the following three subscales: family, friends and significant other. Scale scores range from 12 to 84, and high scores indicate high perceived social support. Cronbach's alpha coefficients of the subscales range from 0.80 to 0.95. Our study Cronbach's alpha coefficient of the MSPSS was 0.84.

## Ethical Considerations

Before beginning the study, a local ethics committee approved the study (Date: 02 May 2013 and no: 18/9). The study was conducted in accordance with the Declaration of Helsinki, and the institution permission and written approval from patients were obtained.

## Data Analysis

The data were analysed using the Statistical Package for Social Sciences (SPSS for Windows version 18.0, Inc., Chicago, IL). Descriptive and clinical characteristics were studied using descriptive statistics as number, percentage, mean and standard deviation. First, the Kolmogorov-Smirnov test was performed to evaluate the conformity of quantitative data to a normal distribution. Results of the analysis revealed that all quantitative variables had a normal distribution ( $p > 0.005$ ). Pearson's correlation coefficients were calculated to determine the relationship between the dependent and independent variables of the study. Multiple linear regression analyses which was performed with enter method were conducted to evaluate the influence of all demographic, clinical, symptomatic data and concepts (illness uncertainty, social support and coping style) variables on each of the dependent variable (KCCQ overall score [Model 1], KCCQ functional status [Model 2] and KCCQ clinical summary score [Model 3]). Independent variables related to health status were compared using the

Student's t test, one way ANOVA and post-hoc Bonferroni test for univariate analyses. A p value of 0.05 was accepted as statistically significant.

## Results

### General Characteristics

Patients demographics show the average age of the patients was 63 years. The patients (n=296) were predominantly male (68.2%) and NYHA-III class (67.9%). The mean LVEF of the patients was 30% and 59.5% had poor LVEF (%30-40), only 40.5% had severe LVEF (<%30). Time of diagnosis was more than three years for 36.8%. Majority of the patients were hospitalized once (65.5%), had drug compliance (89.2%) and perceived health status of the patients was good for 48.6%. 208 participants had information about health conditions from health professionals. Informant was doctor for 64.2%. The most commonly experienced symptoms were fatigue (85.5%), dyspnea (82.4%), activity limitations (56.4%) and edema (42.6%).

### Variables Related to Health Status

Three KCCQ scores were obtained in the study. The KCCQ overall, KCCQ functional state and KCCQ clinical summary scores were  $59.26 \pm 21.66$ ,  $35.30 \pm 15.01$  and  $52.70 \pm 19.80$ , respectively. Pearson's correlation analysis was performed to determine the variables associated with health status. Variables with a significant positive relation on the KCCQ overall score were as follows: fatigue ( $r=0.376$ ;  $p<0.001$ ), dyspnoea ( $r=0.484$ ;  $p<0.001$ ), oedema ( $r=0.626$ ;  $p<0.001$ ), informant ( $r=0.275$ ;  $p<0.001$ ) and social support ( $r=0.192$ ;  $p=0.001$ ). Variables with a significant negative relation were as follows: NYHA class ( $r=-0.370$ ;  $p<0.001$ ), LVEF ( $r=-0.168$ ;

$p=0.004$ ), hospitalisation frequency ( $r=-0.343$ ;  $p<0.001$ ), drug compliance ( $r=-0.155$ ;  $p=0.047$ ), activity limitations ( $r=-0.598$ ;  $p<0.001$ ) and perceived health status ( $r=-0.579$ ;  $p<0.001$ ).

Variables with a significant positive relation on the KCCQ functional status score were as follows: fatigue ( $r=0.384$ ;  $p<0.001$ ), dyspnoea ( $r=0.508$ ;  $p<0.001$ ), oedema ( $r=0.668$ ;  $p<0.001$ ), activity limitations ( $r=0.638$ ;  $p<0.001$ ), informant ( $r=0.289$ ;  $p<0.001$ ) and social support ( $r=0.181$ ;  $p=0.002$ ). Variables with a significant negative relation were as follows: NYHA class ( $r=-0.387$ ,  $p<0.001$ ), LVEF ( $r=-0.182$ ;  $p=0.002$ ), hospitalisation frequency ( $r=-0.390$ ;  $p<0.001$ ), drug compliance ( $r=-0.144$ ;  $p=0.013$ ), perceived health status ( $r=-0.549$ ;  $p<0.001$ ) and illness uncertainty ( $r=-0.125$ ;  $p=0.032$ ).

Variables with a significant positive relation on the KCCQ clinical total score were as follows: fatigue ( $r=0.369$ ;  $p<0.001$ ), dyspnoea ( $r=0.477$ ;  $p<0.001$ ), oedema ( $r=0.635$ ;  $p<0.001$ ), activity limitations ( $r=0.606$ ;  $p<0.001$ ), informant ( $r=0.269$ ;  $p<0.001$ ) and social support ( $r=0.184$ ;  $p=0.002$ ). Variables with a significant negative relation were as follows: NYHA class ( $r=-0.361$ ,  $p<0.001$ ), LVEF ( $r=-0.170$ ;  $p=0.003$ ), hospitalisation frequency ( $r=-0.362$ ;  $p<0.001$ ) and perceived health status ( $r=-0.556$ ;  $p<0.001$ ).

### Multivariate Predictors of Health Status

Multivariate regression models were established with significance variables for the KCCQ overall score (Model 1), KCCQ functional status (Model 2) and KCCQ clinical total score (Model 3). Models 1, 2 and 3 accounted for 66.9%, 72.1% and 66.6% of the variance in health status, respectively (Table 1).

**Table 1.** Multiple Linear Regression Models on KCCQ in Patients With HF

Variables	Model 1		Model 2		Model 3	
	$\beta$	p	$\beta$	p	$\beta$	p
KCCQ (Constant)						
NYHA class	-0.190	0.079	-0.093	0.049	-0.081	0.113
LVEF	-0.034	0.470	-0.019	0.660	-0.043	0.366
Hospitalisation frequency	-0.077	0.114	-0.112	0.013	-0.093	0.056
Drug compliance	-0.018	0.679	-0.066	0.105	-	-
Perceived health status	-0.328	<0.001	-0.258	<0.001	-0.305	<0.001
Informant	0.094	0.041	0.082	0.059	0.089	0.047
Fatigue	0.088	0.069	0.078	0.081	0.080	0.096
Dyspnoea	0.168	0.001	0.173	0.001	0.165	0.001
Oedema	0.239	<0.001	0.274	<0.001	0.247	<0.001
Activity limitations	0.199	<0.001	0.226	<0.001	0.204	<0.001
Illness uncertainty	-	-	-0.125	0.032	-	-
Social support	0.216	0.017	0.258	0.002	0.224	0.013

Multiple linear regression analysis (Enter Method): Model 1 R=0.818; R<sup>2</sup>=0.669;  $p<0.001$ ; Model 2 R=0.849; R<sup>2</sup>=0.721;  $p<0.001$ ; Model 3 R=0.816; R<sup>2</sup>=0.666;  $p<0.001$ ; LVEF: Left Ventricular Ejection Fraction; NYHA: New York Heart Association;  $\beta$ : Beta;  $p<0.005$ ; Statistical significance level.

In Model 1, independent predictors were perceived health status ( $\beta=-0.328$ ;  $p<0.001$ ), informant ( $\beta=0.094$ ;  $p=0.041$ ), dyspnoea ( $\beta=0.168$ ;  $p<0.001$ ), oedema ( $\beta=0.239$ ;  $p<0.001$ ), activity limitations ( $\beta=0.199$ ;  $p<0.001$ ) and social support ( $\beta=0.216$ ;  $p=0.017$ ) (Table 1). In Model 2, independent predictors were hospitalisation frequency ( $\beta=-0.112$ ;  $p=0.013$ ), perceived health status ( $\beta=-0.258$ ;  $p<0.001$ ), dyspnoea ( $\beta=0.173$ ;  $p<0.001$ ), oedema ( $\beta=0.274$ ;  $p<0.001$ ), activity limitations ( $\beta=0.226$ ;  $p<0.001$ ), illness uncertainty ( $\beta=-0.125$ ;  $p=0.032$ ) and social support ( $\beta=0.258$ ;  $p=0.002$ ) (Table 1). In Model 3, independent predictors were perceived health status ( $\beta=-0.305$ ;  $p<0.001$ ), informant ( $\beta=0.089$ ;  $p=0.047$ ), dyspnoea ( $\beta=0.165$ ;  $p<0.001$ ), oedema ( $\beta=0.247$ ;  $p<0.001$ ), activity limitations ( $\beta=0.204$ ;  $p<0.001$ ),

social support ( $\beta=0.224$ ;  $p=0.013$ ) (Table 1).

### Multiple Comparisons of Health Status

Patients with high KCCQ overall scores included the following: those with NYHA III class ( $t=6.83$ ;  $p<0.001$ ), those with severe LVEF ( $t=2.93$ ;  $p<0.001$ ), those without any hospitalisation ( $t=13.34$ ;  $p<0.001$ ), those who are drug compliant ( $t=19.92$ ;  $p=0.047$ ), those with a well-perceived health status ( $t=72.02$ ;  $p<0.001$ ), those whose informants were doctors ( $t=10.42$ ;  $p<0.001$ ), those who experienced no fatigue ( $t=-8.94$ ;  $p<0.001$ ), those without dyspnoea ( $t=-14.89$ ;  $p<0.001$ ), those without oedema ( $t=-13.75$ ;  $p<0.001$ ), those without activity limitations ( $t=-13.26$ ;  $p<0.001$ ) (Table 2).

Patients with high KCCQ functional state scores included

**Table 2.** Multiple comparisons of health status of the patients with HF

Variables	KCCQ overall score		KCCQ Functional state		KCCQ Clinical summary	
	Value (t/F)	p	Value (t/F)	p	Value (t/F)	p
NYHA class*	6.83	<0.001	7.19	<0.001	6.63	<0.001
NYHA III <sup>a</sup>		a>b		a>b		a>b
NYHA IV <sup>b</sup>						
LVEF severity*	2.93	<0.001	3.17	<0.001	2.95	<0.001
Severe LVEF <sup>a</sup>		a>b		a>b		a>b
Poor LVEF <sup>b</sup>						
Hospitalisation frequency <sup>†</sup>	13.34	<0.001	17.82	<0.001	14.99	<0.001
No <sup>a</sup>		a>d		a>d		a>d
Once <sup>b</sup>						
Twice <sup>c</sup>						
More <sup>d</sup>						
Drug compliance*	19.92	0.047	24.89	0.013	18.76	0.062
Yes <sup>a</sup>		a>b		a>b	not significant	a>b
No <sup>b</sup>						
Perceived health status <sup>†</sup>	72.02	<0.001	63.38	<0.001	65.56	<0.001
Well <sup>a</sup>		a>c		a>c		a>c
Moderate <sup>b</sup>						
Poor <sup>c</sup>						
Informant <sup>†</sup>	10.42	<0.001	11.48	<0.001	10.42	<0.001
Nurse <sup>a</sup>		b>a		b>a		b>a
Doctor <sup>b</sup>						
Fatigue*	-8.94	<0.001	-8.79	<0.001	-8.95	<0.001
Yes <sup>a</sup>		b>a		b>a		b>a
No <sup>b</sup>						
Dyspnoea*	-14.89	<0.001	-16.27	<0.001	-15.02	<0.001
Yes <sup>a</sup>		b>a		b>a		b>a
No <sup>b</sup>						
Oedema*	-13.75	<0.001	-15.40	<0.001	-14.07	<0.001
Yes <sup>a</sup>		b>a		b>a		b>a
No <sup>b</sup>						
Activity limitations*	-13.26	<0.001	-14.68	<0.001	-13.58	<0.001
Yes <sup>a</sup>		b>a		b>a		b>a
No <sup>b</sup>						

\*t test; tone way ANOVA (bonferroni post-hoc test); LVEF: Left ventricular ejection fraction; NYHA: New York Heart Association;  $p<0.005$ ; Statistical significance level.

the following: those with NYHA III class ( $t=7.19$ ;  $p<0.001$ ), those with severe LVEF ( $t=3.17$ ;  $p<0.001$ ), those without any hospitalisation ( $t=17.82$ ;  $p<0.001$ ), those who are drug compliant ( $t=24.89$ ;  $p=0.013$ ), those with a well-perceived health status ( $t=63.38$ ;  $p<0.001$ ), those whose informants were doctors ( $t=11.48$ ;  $p<0.001$ ), those who experienced no fatigue ( $t=-8.79$ ;  $p<0.001$ ), those without dyspnoea ( $t=-16.27$ ;  $p<0.001$ ), those without oedema ( $t=-15.40$ ;  $p<0.001$ ) and those without activity limitations ( $t=-14.68$ ;  $p<0.001$ ) (Table 2).

Patients with high KCCQ clinical summary scores included the following: those with NYHA III class ( $t=6.63$ ;  $p<0.001$ ), those with severe LVEF ( $t=2.95$ ;  $p<0.001$ ), those without any hospitalisation ( $t=14.99$ ;  $p<0.001$ ), those with a well-perceived health status ( $t=65.56$ ;  $p<0.001$ ), those whose informants were doctors ( $t=10.42$ ;  $p<0.001$ ), those who experienced no fatigue ( $t=-8.95$ ;  $p<0.001$ ), those without dyspnoea ( $t=-15.02$ ;  $p<0.001$ ), those without oedema ( $t=-14.07$ ;  $p<0.001$ ) and those without activity limitations ( $t=-13.58$ ;  $p<0.001$ ) (Table 2).

## Discussion

Via this study, the authors identified some predictors of the health status of HF patients based on the variables included in the study. The health status and its predictors were examined using three different KCCQ scores. The authors reviewed and discussed the findings of the present study in two items. These are: (a) symptom burden, HF severity, compliance, perceived health status, social support and information as well as (b) illness uncertainty as a predictor of functional status.

The health status of patients with advanced HF was generally low. Physical symptoms, LVEF severity, NYHA IV class, poor perceived health status and lack of social support were associated with low health status.

Physical limitations and acute exacerbation associated with symptoms may have negatively affect patients with HF.<sup>[11, 13, 28, 29]</sup> Furthermore, in patients with HF, health status scores can be expected to decline if LVEF levels decrease or NYHA class deteriorates. NYHA class IV patients were associated with a lower health status in current study. However, health status scores of patients with LVEF values below 30% were unexpectedly higher than others. Moreover, while results of three studies indicated that the NYHA class was an independent predictor for health status,<sup>[13, 14, 30]</sup> LVEF was not found significant in two previous studies related to HRQoL or health status.<sup>[31, 32]</sup> This may be due to the variability of changes in the clinical status of patients

with preserved and reduced ejection fraction shown in recent HF guideline.<sup>[33]</sup>

Perceived health status is subjective and can affect emotional and behavioural responses to patients' life changes.<sup>[34]</sup> In the current study, the perceived health status was an independent predictor of the health status; a poor perceived health status was associated with a lower health status. A review of the literature reported that patients with poor health perceptions are at a higher risk of future hospital admissions and mortality.<sup>[12]</sup> It can be said that patients with poor health perceptions are insufficient in their physical, social, functional and self-efficacy domains. Additionally, patients may have experienced symptoms more frequently, symptoms may be more severe, and there might be acute exacerbations of symptoms. Results of previous studies have indicated that perceived health status is affected by physical symptoms<sup>[35]</sup> and is associated with reduced physical activity, adherence to treatment,<sup>[16, 36]</sup> lifestyle modification, being informed and social support.<sup>[16]</sup>

Social support scores were positively associated with health status in the study. In fact, loss of roles, social limitations and isolation can be experienced in patients with HF. However, it is expected that patients with HF should perform important self-care activities such as adjusting diet and treatment, maintaining physical activity and managing their symptoms.<sup>[14, 37]</sup> Therefore, the existence of social support systems is essential. Heo et al.<sup>[14]</sup> showed that perceived social support was related to better physical and emotional domains of HRQoL. In two previous studies, it was shown that spouses and close family members have the most important social support network.<sup>[37, 38]</sup> Luttik et al.<sup>[37]</sup> reported that social support is strong predictor of hospital readmissions and mortality.

In the current study, unlike in many other studies, illness uncertainty was an independent predictor of functional health. It can be thought to be mainly owing to the symptom burden. However, the question should be how the uncertainty related to symptom experience could affect the functional health status. The authors believe that uncertainty about the three main symptoms (dyspnoea, oedema and activity limitations) of HF has a negative effect on the functional status. The fact that these symptoms that are common specifically in NYHA III and IV classes in patients with advanced HF are related to uncertainty was not a surprising result. This is based on the fact that life-threatening diseases such as HF are associated with the unpredictability of symptoms, severity, duration, and variability, and correspond to the concepts of symptom pattern, event famil-

ilarity, and event compliance mentioned in Mishel's theory.<sup>[24, 39]</sup> According to the theory, these specific symptoms can be observed several times, patients can get familiar with them and this might cause less uncertainty. However, how the patient interprets the repetitive property of the symptoms itself is an important point in the severity of uncertainty.<sup>[24]</sup> Hence, a negative increase in the perception of patients regarding such situations can prevent the relief of symptoms and cause uncertainty as an emotional response.<sup>[40]</sup> Bosworth<sup>[41]</sup> reported that patients frequently experienced dyspnoea, edema and fatigue, that these symptoms adversely affected all aspects of their health status and caused anxiety and fear due to uncertainty associated with HF. Clark and Lan,<sup>[42]</sup> in their study about instruction needs after discharge, revealed that patients with HF need information the most about the symptoms.

## Conclusion

In summary, in this study, it was determined some variables that predict health status of patients with advanced HF. The common predictor variables for the three clinical scores of health status were symptom burden, perceived health status, social support, and information from the physician. Through the findings of the study, it can be emphasized that the quality of patient education should be improved and biopsychosocial approach should be featured in health care services in order to achieve better health outcomes. In addition, although illness uncertainty is a predictor variable on the health-related functional status of HF patients, it is thought to provide direct support to health care if examined together with concepts such as self-care, self-efficacy, social support, and coping with stress.

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