

TURKISH VERSION OF THE DUTCH HEART FAILURE KNOWLEDGE SCALE: VALIDITY AND RELIABILITY

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Contribution

SCS conceived the idea and designed the study. Data collection and manuscript writing was done by SCS, SC, GO, and SS. All the authors contributed equally to the submitted manuscript.

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ABSTRACT

Objective: To determine the validity and reliability of the Turkish version of the Dutch Heart Failure Knowledge Scale.

Methodology: The cross sectional study was composed of patients who were followed up in cardiology clinics of a university hospital in Malatya. Consecutive patients were enrolled in the study. Data were collected using Dutch Heart Failure Knowledge Scale, along with a questionnaire regarding demographic properties. The scale consisted of 15 items, and every item was scored as either 0 or 1. Confirmatory Factor Analysis and Exploratory Factor Analysis were applied to assess the Scale validity.

Results: Dutch Heart Failure Knowledge Scale reliability was assessed with Cronbach's alpha internal consistency coefficient, item-total score correlation, and test-retest analysis, which ranged between 0.70-0.82, 0.54-0.86, and 0.30-0.52, respectively.

Conclusion: The results of Confirmatory Factor Analysis and Exploratory Factor Analysis supported the single factor scale structure and Confirmatory Factor Analysis yielded good fit indices. The Dutch Heart Failure Knowledge Scale Turkish version is valid, reliable.

Keywords: Dutch heart failure knowledge scale, Turkish version, validity, reliability

INTRODUCTION

Heart failure (HF) is an important health issue with ever increasing incidence, and causes high mortality and morbidity rates.^{1,2} According to American Heart Association (AHA) 2016 data, there are about 5.7 million people with HF in the US. HF is the cause of death for 1 in every 9 fatalities, and its prevalence is expected to increase by 46% until 2030, affecting over eight million people.^{3,4} HF also appears to be a significant health problem in Turkey. The approximate prevalence of HF in Turkey is 6.9%, and it is estimated that there are 2 million 424 adult HF patients.⁵

HF reduces life quality, causes increased hospitalizations and financial load, and is a burden for both the patient and the society.^{6,7} Upon diagnosis of HF, both the patient and the family need to be informed about the disease itself, medical treatment options, dietary restrictions, and the symptoms suggesting deterioration of HF.⁸ Patient education begins with information about the structure and function of the heart, then continues with the course and causes of the disease.⁹ The education then focuses on the management of HF (use of drugs, resting, low-salt diet, physical activity, weight and swelling control, etc.). It is completed with information on the symptoms of HF, how to avoid/treat them, and when it is necessary to consult the physician or the nurse.¹⁰ At the end of this education, the patient is fully equipped with the knowledge that is required to cope with the disease.¹¹

It is essential with regard to management of the disease that individuals with HF monitor their disease-related symptoms and assess their conditions in their routine life.^{12,13} Studies indicate that individuals with HF often do not seek medical attention when they develop a disease-related symptom. Possible reasons were reported as not monitoring symptoms daily and failure to notice it early when HF develops.¹⁴

Optimal health state in cases of HF is only possible if patients are aware of the disease symptoms and comply with the treatment regime.¹⁵ Non-compliance not only leads to deterioration of symptoms, but also increases in the number of hospitalizations as well.¹⁶ Although knowledge about the disease and the treatment regime does not guarantee compliance

with the disease, it certainly has an important role in disease management.¹⁵ Recent guidelines on HF demonstrate the importance of knowledge about pharmacological and non-pharmacological methods in disease management as well as recognition of the disease symptoms.¹⁷

Education and counseling are important coping mechanisms for HF patients. To assess the influence of this training and counseling, the level of patient's knowledge must be determined. For this purpose, in 2005 Van der Wal et al. developed the Dutch Heart Failure Knowledge Scale (DHFKS), which assesses an individual patient's overall knowledge about the disease.¹⁷ However, there is no valid or reliable tool to assess the knowledge of patients in Turkey. Therefore, this study was done to determine validity/reliability of DHFKS Turkish version (DHFKS-TR).

METHODOLOGY

This descriptive cross sectional study included adults with HF that were followed at the Cardiology clinic of a university hospital in Malatya. The number of adults with HF who were recruited was twenty times the number of the items in the scale and the sample size was adequate for examining validity and reliability in this study.^{18,19} Three hundred HF subjects with literacy, communication ability and no psychiatric complications were included. The data were collected between April and September 2018.

The DHFKS-TR and collected patient data were used to gather information for the project.

A questionnaire of 5 items included the patient socio-demographic, medical, and physiological characteristics.

Dutch Heart Failure Knowledge Scale was established by Van der Wal et al. in 2005. The scale consists of 15 items, and every correct answer was scored as 1 and a false answer was scored as 0. The scale was evaluated with a single sub-dimension indicating the patient's HF knowledge. DHFKS can be completed within 5-10 minutes. Cronbach's alpha coefficient that was created by Van der Wal et al. was 0.62.¹⁷

DHFKS was translated into Turkish by investigators and two linguistic scientists. After translation into Turkish, the items of the Turkish version were reviewed by two linguistic scientists by comparing the Turkish version with the original scale. Therefore, changes were not made to the meaning of the scale items.

To test content validity, 10 expert academic members (9 internal medicine specialist nurse and 1 cardiologist) were requested to review the items of the English and Turkish versions of the scale to examine the relevancy and clarity of the Turkish version, and score each item between 1 – 4 points (1 = not relevant; 2 = needs major adjustment; 3 = needs minor adjustment; and 4 = completely relevant). The level of agreement between the experts was examined with Kendall W analysis.²⁰ Statistically, no change was determined from the scores of the experts (Kendall W = 0.200; $p > 0.05$), and there was agreement among the experts.

To determine the Construct Validity of the scale Confirmatory Factor Analysis (CFA) and Exploratory Factor Analysis (EFA) were applied.

For testing reproducibility of DHFKS-TR, the scale was re-applied to 30 HF patients after 2 weeks. Reproducibility was assessed with correlation of the first and subsequent test scores.²¹ A p -value ≤ 0.05 was considered significant.

The present study granted approval by the ethics committee (Decision No:2018/11-8). Informed consent from the patients that volunteered was obtained.

RESULTS

Patient socio-demographic, medical, and physiological findings are shown in Table 1. Of all the study participants, 57.7% were male, 84.3% were married, and 36% were graduates of primary school. The mean age was 62.86 (± 13.39) years and the mean body mass index (BMI) was 28.93 (± 3.90) kg/m². Some of the participants (58.7%) were NYHA II; and the mean HF duration was 1.81 (± 0.75) years.

To assess the Validity, KMO analysis yielded a KMO coefficient of 0.93, and the Barlett's Test analysis yielded a χ^2 value of 3,685.78. The test results were statistically significant ($p < 0.001$). This outcome indicated a sufficient sample size. EFA that was performed to test the validity of DHFKS yielded

factor loading value between 0.70 - 0.95. Additionally, it explained 46.59% of the total variation (Table 2). Thus, single-dimension DHFKS consisting of 15 items was obtained.

Table 1. Study Population Demographics and Characteristics

Characteristics	Summary Statistics
Total (N)	300
Sex	
Female	42.3% (127)
Male	57.7% (173)
Marital status	
Married	84.3% (253)
Single	15.7% (47)
Education level	
Primary education	36% (108)
High school	36% (108)
University	28% (84)
Heart failure classification	
NYHA II	58.7% (176)
NYHA III	28% (84)
NYHA IV	13.3% (40)
Age (years)	62.86 \pm 13.39
Bml(kg/m ²)	28.93 \pm 3.90
Duration heart failure (years)	1.81 \pm 0.75

In confirmatory factor analysis (CFA) of DHFKS, the following agreement indices were calculated: $\chi^2=131.02$, $df= 90$ ($p < 0.05$), $\chi^2/df=1.45$, RMSEA=0.039, GFI=0.94, CFI=0.98 and IFI=0.98. The model was determined to display acceptable agreement. CFA Path Diagram of DHFKS-TR is shown in Figure 1. The Reliability of the scale was assessed by Cronbach's alpha reliability coefficient of the DHFKS-TR has found as 0.86 (Table 2). Total correlation scores of the DHFKS-TR ranged from 0.68 and 0.92 and the correlation coefficients of all items were greater than 0.30, which shows reliability. We observed factor loadings of the DHFKS-TR that were dispersed between 0.70 and 0.98.

The average scores at the first and second measurement of DHFKS-TR had a correlation of 0.998 to 1.00, which were positive ($r=0.85-0.98$) and significant ($p < 0.001$).

Table 2: Statistics of the DHFKS

Scale items	Factor Loading	Item Mean (SD)	Corrected Item-total Correlations	Cronbach's Alpha if Item Deleted
1	0.91	0.57 (0.49)	0.83	0.84
2	0.82	0.31 (0.46)	0.84	0.87
3	0.88	0.58 (0.49)	0.80	0.84
4	0.74	0.27 (0.44)	0.64	0.87
5	0.91	0.58 (0.49)	0.83	0.84
6	0.81	0.27 (0.44)	0.95	0.87
7	0.85	0.32 (0.46)	0.72	0.87
8	0.70	0.34 (0.47)	0.90	0.87
9	0.98	0.57 (0.49)	0.92	0.83
10	0.98	0.39 (0.49)	0.68	0.87
11	0.71	0.43(0.49)	0.84	0.87
12	0.88	0.57(0.49)	0.83	0.84
13	0.86	0.63(0.48)	0.75	0.84
14	0.95	0.58(0.49)	0.87	0.83
15	0.95	0.57 (0.49)	0.88	0.83
% Variance Explained				46.59
Cronbach alpha				0.86

DISCUSSION

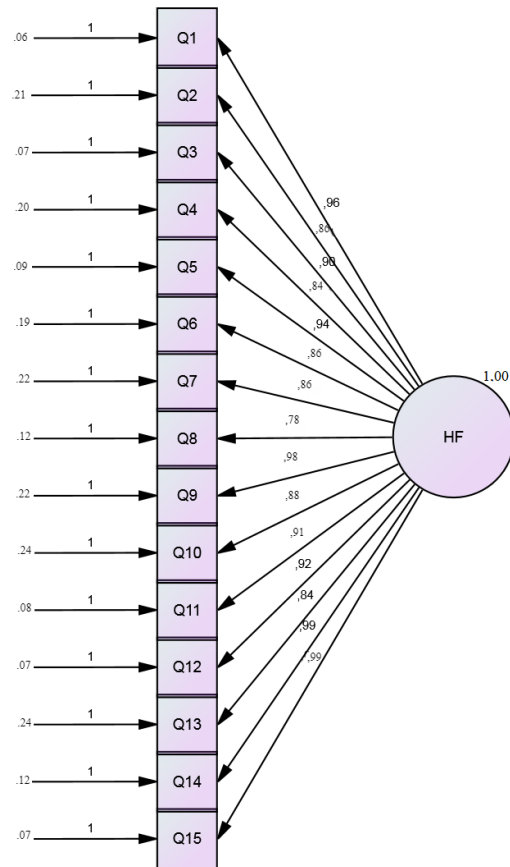
This study translated the DHFKS in a Turkish version. The DHFKS was found to be a valid and reliable for all HF subjects tested.

To assess the construct validity of the DHFKS-TR, EFA and CFA were applied. As in the original scale, the Turkish version was also found to segregate under a single factor, explaining 46.59% of the variation. It is known that higher variance ratios indicate higher factor structure of a scale. The variance ratios ranging from 40 to 60% have been regarded as sufficient in analyses performed in social science studies.²² It has been recommended to exclude items with a factor loading of 0.30.²³⁻²⁵ We observed that the DHFKS-TR factor findings were dispersed between 0.70 - 0.98 (Table 2). Therefore, none of the scale items were excluded from analysis. Factor analysis of DHFKS-TR showed that the factor construct was valid.

CFA supported the single-factor scale construct as shown by EFA. In order to assess whether the model was in agreement with the data, agreement wellness indices were taken into account. The χ^2/df and RMSEA values indicated lack of good agreement. Literature suggests χ^2/df value of ≤ 3 shows excellent agreement, and values between ≤ 3 and ≤ 5 show good agreement. RMSEA value of 0.08 or lower is acceptable.²⁶ We found CFA agreement indices as: $\chi^2=131.02$, $df= 90$ ($p<0.05$), $\chi^2/sd=1.45$, RMSEA=0.039, GFI=0.94, CFI=0.98 and IFI=0.98.

The model displayed satisfactory agreement (Figure 1).

Figure 1: CFA Path Diagram of DHFKS



The reliability of DHFKS was assessed with Cronbach's α internal consistency coefficient, item-total score correlation, and test-retest analysis. As a gauge of the internal consistency and homogeneity of DHFKS, Cronbach's alpha reliability coefficient was calculated. Acceptable reliability coefficient for a scale should be close to 1. It has been reported that values between 0.60-0.79 high reliability, and 0.80-1.00 excellent reliability.²⁷⁻²⁹ Higher Cronbach's alpha coefficients indicate the scale consists of items that are consistent with each other.¹⁹ Cronbach's alpha coefficient calculated in the validity and reliability study of the original scale was 0.62.¹⁷ In the present study, we calculated Cronbach's alpha reliability coefficient as an indicator of internal consistency and homogeneity of DHFKS, and found it to be 0.86 (Table 2). This result indicates that the scale has internal consistency.

Item analysis refers to the association of the scores from each item of the scale and the total score. Item correlation coefficients lower than 0.30 indicates lack of reliability.³⁰ Item-total score correlation of the DHFKS-TR was found to range between 0.68 and 0.92 (Table 2). Every item of the scale showed a correlation with the total scale above 0.30. Therefore, item-total score correlations of the DHFKS-TR are at the sufficient reliability level.

When the DHFKS-TR was used on 30 HF patients at the 2-week interval for the test-retest analysis of the scale. The results were determined a positive and significant association. This demonstrates a high questionnaire internal consistency, and reliable results were obtained in multiple applications.

CONCLUSION

The results of the questionnaire were consistent with the original version. Similar to the original version, one-factor was established. The Cronbach's alpha internal consistency coefficient, item total correlation, and test-retest analysis of the questionnaire was high correlation. The DHFKS-TR is valid and reliable to evaluation of complications encountered with knowledge of heart failure.

It was a single center and that's the one of the limitation of the study. Additionally, psychometric appropriateness of the scale should also be investigated in larger cohort studies.

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