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Cross-cultural adaptation, reliability, and validity of the Turkish version of the Cancer Fatigue Scale in patients with breast cancer

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Background/aim: The Cancer Fatigue Scale (CFS) was developed to evaluate the severity of fatigue in patients with breast cancer. The aim of this study is to translate and culturally adapt a Turkish version and investigate the validity and reliability of the CFS in Turkish patients with fatigue symptoms.

Materials and methods: Eighty participants completed the Turkish version of the CFS for breast cancer and the European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire "Core 30" (EORTC QLQ-C30). Test–retest reliability was evaluated by repeating the CFS with a 7-day interval.

Results: The CFS demonstrated high test–retest reliability (ICC = 0.95) and good internal consistency (Cronbach's alpha = 0.74) for all domains. The Kaiser–Meyer–Olkin measure of sampling adequacy was found to be 0.819, which is considered to be satisfactory (>0.5). Correlations between domains of CFS physical and EORTC physical (r: 0.77), CFS cognitive and EORTC cognitive (r: 0.70), and CFS physical and EORTC fatigue (r: 0.80) were found to be significant.

Conclusion: The Turkish version of the CFS is a reliable and valid instrument to assess physical, effective, and cognitive dimensions of fatigue. The CFS may be used to evaluate the severity of fatigue in Turkish-speaking breast cancer patients.

Key words: Breast cancer, fatigue, reliability, validity, Turkish

1. Introduction

Fatigue is one of the most common symptoms among cancer patients. It is reported that fatigue frequency ranges between 34% and 76% among cancer survivors. The National Comprehensive Cancer Network defines cancer-related fatigue as a persistent feeling of increase in tiredness and decrease of energy and performance, lack of energy or motivation, and problems with concentration (1). Studies showed that the prevalence of fatigue among breast cancer patients is greater than 50% or approximately one in three patients (2,3). Goedendorp et al. showed that patients with breast cancer tend to report higher levels of fatigue compared to other types of cancer (4). The etiology of fatigue in patients with breast cancer is not fully known, so it is not possible to mention a single etiologic factor. Female sex, age, and undergoing radiotherapy and/or chemotherapy are thought increase the risk for fatigue in breast cancer (5). Among these studies, about half have found no relationship between age and fatigue, whereas the other half reported that being younger is associated with fatigue. Additionally, few studies have substantiated the view that fatigue is associated with marital status and education level (6). It is known that severity of fatigue is affected by demographic characteristics and treatments and their side effects. However, it is also important to consider dietary habits, environmental factors, and one's lifestyle.

Fatigue is a multidimensional problem that can affect patients' physical, emotional, social, and cognitive functioning at various degrees, and it usually causes a noticeable decrease in the quality levels of everyday lives of patients (7). It is known that fatigue affects patients at varying degrees, and it is necessary to assess this multidimensionally. Commonly used multidimensional scales for assessing cancer-related fatigue in patients with breast cancer are the Rhoton Fatigue Scale, Piper Fatigue Scale, Multidimensional Fatigue Inventory, and Cancer Fatigue Scale (CFS) (8–11).

The CFS was developed in Japan in 2000 by Okuyama et al. The scale consists of three subheadings: physical, emotional, and cognitive, with a total of 15 items. It has been used in several studies with cancer patients so far

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(11–13). Previous studies have shown that as well as the original Japanese version, German, Chinese, Arabic, and Greek versions are reliable and valid for different cancer populations (14–17). The CFS is an assessment that gives information about bio-psycho-social factors on fatigue in cancer and it is widely used in cancer research. In clinical settings, limited time requirements and easy scoring of the test are the greatest advantages of the CFS among other cancer fatigue scales. Therefore, the purpose of this study is to assess the reliability and the validity of the cross-cultural adapted Turkish translation of the CFS among patients with breast cancer.

2. Materials and methods

At the beginning of the study, the permission of the authors of the original version of the CFS was received to translate and validate the scale in the Turkish language.

2.1. Study population

The study was conducted at the Oncology Department of Hacettepe University Hospitals. Patients were eligible in terms of meeting the following participation criteria: 1) being between the ages of 18 and 64 years; (2) having breast cancer in stage 1, 2, or 3; 3) not undergoing a radiotherapy or chemotherapy session in at least the last 2 weeks; 4) literate and willing to join the study. Patients were ineligible if they: 1) had relapsed or were in palliative care; 2) were suffering from cognitive disorders (mini mental state score of <23); 3) showed neurological signs or clinical instability. During the study process, 86 patients who were diagnosed with breast cancer were screened as potential participants. Six of the patients subsequently met exclusion criteria: five did not come for the retest, and one requested to be removed from the study. As a result, our study population consisted of 80 patients with breast cancer.

2.2. Instruments

A sociodemographic form, the CFS, and the European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire Core 30 (EORTC QLQ-C30 version) were filled out by all the participants. The sociodemographic form was prepared by the researchers, comprising questions about age, sex, marital status, stage of breast cancer, and whether undergoing chemotherapy (neoadjuvant and adjuvant) and radiotherapy at the moment or not.

The CFS is a scale that was developed to measure fatigue in Japanese patients, especially in breast cancer patients. It includes three dimensions: physical, affective, and cognitive. A five-point Likert scale (1–5) is used for each question and the maximum score for the CFS physical function (CFS-P) is 28 points, 16 points for the CFS affective function (CFS-A), 16 points for the CFS cognitive function (CFS-C), and 60 points for CFS total (CFS-T) (18).

The EORTC QLQ-C30 is a widely used scale in cancer. Validation of the Turkish version was carried out by Guzelant et al. in 2004 (18). The EORTC QLQ-C30 is made up of 30 items and includes general well-being, functional difficulties, and symptom control. Likert-type scores from 1 (none) to 4 (very) are used for the first 28 of 30 items, while Likert-type scores from 1 (very bad) to 7 (perfect) are used for items 29 and 30. In the present research, the EORTC QLQ-C30 was used as a gold-standard test to assess the fatigue and physical-emotional-cognitive function parameters of the participants. Low scores indicate high quality of life, while high scores indicate low quality of life in these sections. Items 10, 12, and 18 assess fatigue, items 1–5 assess physical function, items 21–25 assess emotional function, and items 20–25 assess cognitive function (19).

2.3. Translation and cross-cultural adaptation

The CFS was translated from English to Turkish according to the standard methodology recommended by Beaton et al. (20). The translation was done by two independent translators whose native languages were Turkish. After synthesizing the translated versions with two native speakers, the final version of the translation was developed. The final Turkish version was translated back from Turkish to English again by two native English speakers who could speak Turkish fluently. This version was compared with the original version for inconsistencies. There was no inconsistency with the original version. The aim of cross-cultural adaptation was to attain consistency in the content and face validity between the original and translated versions of the questionnaire. Only 1 item (Q4) of the CFS was changed, from "becoming careless" to "becoming distractible", because the former expression has a different meaning in the Turkish language. The scales to evaluate the test–retest reliability were administered twice to 80 patients with breast cancer within a 7-day interval (21).

2.4. Statistical analysis

The CFS scale was tested for reliability using the Turkish version administered to 80 patients with breast cancer. The patients filled out the questionnaires twice in 7-day intervals. Reliability analysis of all 15 items of the CFS was carried out for all patients with IBM SPSS 23.0 to determine item–item, item–total, and Cronbach's alpha reliability. Test–retest reliability of the CFS was evaluated using Pearson correlation coefficients (>0.7 acceptable; >0.8 good; >0.9 excellent). The internal consistency was measured with Cronbach's alpha, which measures the degrees of items that make up the total score. An acceptable value for Cronbach's alpha is ≥0.7, but values of ≥0.8 are good and ≥0.9 are excellent (22). The construct validity of the scale was calculated by exploratory factor analysis with varimax rotation. Pearson correlation coefficients were calculated between the CFS total/subscale scores and EORTC QLQ-C30 fatigue/physical/emotional/cognitive

function subscale scores to determine criterion-related validity.

3. Results

3.1. Descriptive statistics

A total of 80 patients with breast cancer completed the test and retest assessments. The mean age of the participants was 46.41 ± 10.31 years (min = 20, max = 64). Table 1 shows the demographic characteristics of patients. Most patients were aged between 41 and 65 years (72.5%), had a university degree (38.8%), and had the diagnosis for 6 months to 3 years (38.8%).

3.2. Reliability of the CFS

The test–retest correlation coefficients of each item and the total score between the test and retest phases were found to be excellent with an ICC value above 0.9 ($P < 0.01$) (Table 2).

Table 1. Demographic characteristics of the study population (N = 80).

Variable	N	%
Age		
18–25	5	6.3
25–40	17	21.3
41–65	58	72.5
Level of education		
Primary school	9	11.3
Secondary school	17	21.3
High school	23	28.8
University	31	38.8
Stage		
1	6	7.5
2	49	61.3
3	25	31.3
Time from diagnosis		
6 months to 3 years	31	38.8
4–6 years	25	31.3
7–10 years	19	23.8
>10 years	5	6.3
Radiotherapy		
Yes	18	22.5
No	62	77.5
Chemotherapy		
Yes	52	65
No	28	35

Table 3 shows mean scores of the items and the correlations of item to item, subscales, and internal consistency. Internal consistencies of the total fatigue scale and the three subscales were found to be acceptable with Cronbach's alpha of 0.74.

3.3. Construct validity

The construct validity of the CFS was analyzed using factor analysis with varimax rotation. Applicability of the rotation was determined by the assumptions of the initial factor analysis. Kaiser–Meyer–Olkin measure of sampling adequacy was found to be 0.819, while Bartlett's test of sphericity had a result of 725.371 with $P = 0.0001$. These results show that our study population for the CFS was appropriate for factor analysis.

The Turkish CFS showed 3 factors in analysis in the original version. These 3 factors explained a total of 69.03% of the variance. In terms of item distribution according to the factors, all items were similar to the original scale, which means the three dimensions presented in the original scale were also presented in the current Turkish validity study (Table 4).

3.4. Criterion-related validity

Pearson correlation coefficients were computed between all subtests of the CFS and EORTC QLQ-30 scale. The EORTC QLQ-30 scale was particularly chosen because it is carried out in accordance with the assessments of the physical and cognitive functions of the patients with cancer as well as their assessment of fatigue (23). All subscales of the CFS and EORTC QLQ-30 subscales were analyzed. Correlations were found to be in a range between weak and strong in subscales, but not in between CFS-P and EORTC cognitive function, and both CFS-C and CFS-A with EORTC physical function. As far as the criterion validity of the CFS is concerned, all correlations were found to be significant. The strongest correlation was found between the CFS-P and EORTC fatigue subscales ($P < 0.001$; r: 0.80) (Table 5).

4. Discussion

This study describes the translation and psychometric testing in terms of reliability and validity (construct and criterion-related) of the 3-factor and 15-item Turkish version of the CFS. For all dimensions of the Turkish version, the internal consistency of the CFS was found to be acceptable (coefficient alpha values were ≥0.7). The degree of internal consistency observed in the present study ($\alpha = 0.74$) was lower than that of the original validation study ($\alpha = 0.88$) (11). The low score in our study could be due to inadequate sample size or inclusion of just one type of cancer. However, Cronbach's α values of the physical (0.89), affective (0.93), and cognitive (0.84) subscales of the CFS were higher than those of the original study, which is thought to be due to the result of including

Table 2. Mean scores and test–retest reliability of the CFS.

CFS	Before		After		Test–retest reliability
	Mean	SD	Mean	SD	(ICC)
CFS-P	17.81	5.50	17.22	4.78	0.94*
CFS-A	7.58	2.35	7.82	2.17	0.93*
CFS-C	7.42	3.80	7.72	3.26	0.94*
CFS-T	32.82	7.33	32.77	6.41	0.95*

* P < 0.001, CFS: Cancer Fatigue Scale, CFS-P: Cancer Fatigue Scale-Physical, CFS-A: Cancer Fatigue Scale-Affective, CFS-C: Cancer Fatigue Scale-Cognitive, CFS-T: Cancer Fatigue Scale-Total.

Table 3. Item, subscale, and scale descriptive and reliability measurements (N = 80).

Item	Mean	SD	α if item deleted	Item/scale correlation	Cronbach's α
CFS- Total	17.81	5.50	-	-	0.74
CFS- P	*	*	-	-	0.89
Q1- Do you become tired easily?	3.60	1.14	0.89	0.65	-
Q2- Do you have the urge to lie down?	3.83	0.93	0.87	0.79	-
Q3- Do you feel exhausted?	3.76	0.88	0.88	0.68	-
Q6- Does your body feel heavy and tired?	3.63	1.02	0.88	0.71	
Q9- Everything is too much?	3.31	0.94	0.88	0.71	
Q12- Many things are too exhausting?	3.32	1.05	0.88	0.71	
Q15- Do you feel such fatigue that you don't know what to do with yourself?	3.33	0.98	0.88	0.67	
CFS-A	*	*	-	-	0.93
Q5- Do you feel energetic?	2.10	0.90	0.75	0.75	-
Q8- Do you feel interest in anything?	2.93	1.07	0.82	0.61	-
Q11- Can you concentrate on certain things?	2.55	0.85	0.81	0.60	-
Q14- Can you pull yourself together to do anything?	2.40	1.00	0.77	0.70	-
CFS-C	*	*	-	-	0.84
Q4- Do you think that you have a lack of concentration?	3.32	1.13	0.81	0.67	
Q7- Do you feel that you more often make errors while speaking?	2.80	1.07	0.76	0.79	
Q10- Do you feel you have become forgetful?	2.82	0.96	0.84	0.58	
Q13- Do you feel that your thinking has become slower?	2.47	1.37	0.79	0.74	

*See Table 2 for mean scores; Q: Question, CFS: Cancer Fatigue Scale, CFS-P: Cancer Fatigue Scale-Physical, CFS-A: Cancer Fatigue Scale-Affective, CFS-C: Cancer Fatigue Scale-Cognitive, CFS-T: Cancer Fatigue Scale-Total.

patients with a particular type of cancer. Compared to the original validation study, three dimensions of the original fatigue scale were available in the Turkish version with a varimax rotation (11).

In the original study, the test–retest reliability result was found to be r = 0.80, in the German version it was r = 0.82, and in the Greek version it was r = 0.79 (all P < 0.001) (14,17). The perfect stability of the CFS original in German and Greek versions was also found in our study (r = 0.95, P < 0.001), and our result was comparable to those of the previous validation studies. The mean scores of the three dimensions were also found higher compared

Table 4. Factor analysis of the CFS (N = 80).

	Factor component		
	Factor 1 - physical	Factor 2 - cognitive	Factor 3 - affective
Q1	0.695		
Q2	0.836		
Q3	0.821		
Q4		0.783	
Q5			0.822
Q6	0.823		
Q7		0.868	
Q8			0.806
Q9	0.732		
Q10		0.708	
Q11			0.768
Q12	0.711		
Q13		0.901	
Q14			0.822
Q15	0.760		
Eigenvalue after rotation	5.573	2.531	2.252
% variance explained after rotation	37.15%	16.82%	15.01%

Table 5. Criterion-related validity of the CFS.

	EORTC Fatigue	EORTC Physical function	EORTC Emotional function	EORTC Cognitive function
CFS-T	0.615**	0.570**	0.282**	0.438**
CFS-P	0.800**	0.772**	0.267*	0.126
CFS-A	0.398**	0.148	0.485**	0.345*
CFS-C	0.283*	0.152	0.231*	0.709*

* $P < 0.05$, ** $P < 0.001$, CFS: Cancer Fatigue Scale, CFS-P: Cancer Fatigue Scale-Physical, CFS-A: Cancer Fatigue Scale-Affective, CFS-C: Cancer Fatigue Scale-Cognitive, CFS-T: Cancer Fatigue Scale-Total.

to all the other studies. While the other studies included patients with different types of cancer, having patients with one type of cancer is thought to be the reason for this high score in the present study. Also, the literature indicates that patients with breast cancer have the highest level of fatigue compared to other cancer populations and it is thought that this may lead to this high score as well (5,24,25). The current validation study also provided evidence for the criterion validity of the CFS in Turkish.

The CFS and EORTC QLQ-C30 were correlated significantly in almost all of their subscales. The CFS-T and EORTC fatigue, CFS-P and EORTC physical and fatigue, CFS-A and EORTC emotional, and CFS-C and EORTC cognitive subscales were significantly and positively correlated. The criterion validity was found to be acceptable. According to Pearson correlation coefficients, all three subscales were found to be acceptable, which is comparable with other validation studies. In spite of differences of methodology, the results indicate that Turkish version of the CFS is consistent with the consistency of the positive results of the previous CFS version studies (11,14,16).

As in the previous validation studies, the sample size is big enough to generalize Cronbach's α score. Regarding

the limitations of our study, the number of patients could be kept higher to obtain a higher score. However, most of the previous validation studies, except for the study of Montazeri et al., included patients with various types of cancer and not particularly breast cancer patients (14–16). At this point, our study might provide a significant benefit for fatigue assessment scales that are specifically tailored to breast cancer. To clarify the validity and reliability of the CFS, further studies with higher numbers of participants should be planned.

In conclusion, the Turkish version of the CFS was found to be a reliable and valid fatigue scale in patients with breast cancer. This is an important and major contribution to the literature, as it provides evidence of the reliability, validity, and cross-cultural adaptation of the Turkish CFS in patients with breast cancer. Additionally, with its good internal consistency, the Turkish CFS can also be useful for other types of cancer patients. In the literature, it is seen that the number of unidimensional scales is more than multidimensional scales that measure fatigue. As fatigue is a multidimensional symptom, we suggest using multidimensional scales such as the CFS, which might inform clinicians or practitioners about both evaluations and interventions with a broader perspective. The CFS evaluates fatigue from a multidimensional perspective in a brief and practical manner, which makes it more significant than the other fatigue scales for patients with breast cancer.

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