Psychometric Properties and Measurement Equivalence of the English and Chinese Versions of the Functional Assessment of Cancer Therapy-Cognitive in Asian Patients With Breast Cancer

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A B S T R A C T

Objective: This study was designed to examine the psychometric properties and measurement equivalence of the English and Chinese versions of the Functional Assessment of Cancer Therapy-Cognitive Function (Version 3) (FACT-Cog) in multiethnic Asian patients with breast cancer. **Methods:** This prospective study involved patients with breast cancer from the National Cancer Centre Singapore. The concurrent validity of the FACT-Cog was assessed according to its strength of correlation with the validated European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire 30 cognitive functioning scale, and its association with fatigue, global health status, and anxiety. The known-group validity was assessed on the basis of receipt of chemotherapy. Factor analysis was conducted to ascertain the one-factor structure of each cognitive domain. The reliability was evaluated by using Cronbach's alpha and intraclass correlation coefficient within the cognitive domains. Multiple regression analyses were performed to compare the total scores between the two language versions, adjusting for covariates. **Results:** A total of 185 English-speaking and 143 Chinese-speaking patients were recruited. Both the English and Chinese FACT-Cog total scores correlated strongly with the European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire 30 cognitive functioning scale scores ($r = 0.725$ and 0.646), whereas correlations with fatigue, anxiety, and global health status were weak to moderate ($|r| = 0.376$–0.589). Regarding the known-group validity, more severe perceived cognitive disturbance was observed among patients receiving chemotherapy than among those who were not for both versions ($P = .010$ and .008, respectively). Internal consistencies within the cognitive domains were high (Cronbach's α 0.707–0.929), and test-retest reliability was satisfactory for both versions (intraclass correlation coefficient 0.762 and 0.697). The measurement equivalence between the English and Chinese versions was established for all domains except the multitasking domain. **Conclusion:** The English and Chinese versions of the FACT-Cog are valid, reliable, and equivalent for clinical and research use.

Keywords: breast cancer, chemobrain, chemofog, chemotherapy, cognitive function, FACT-Cog, psychooncology, quality of life, validation.

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Introduction

A substantial amount of research has suggested that cognitive impairment affects 19% to 78% of the patients with breast cancer [1–4]. In the literature, the terms "chemobrain" and "chemofog" have been used to refer to the subtle yet notable deterioration in patients' cognitive domains, which include memory, concentration, mental acuity, learning, processing speed, and executive functioning. To emphasize, this worsening of cognitive function may be subtle, but studies have shown that it can have a detrimental effect on the health-related quality of life (HRQOL) and functional independence of patients with breast cancer [5–7].

The Functional Assessment of Cancer Therapy-Cognitive Function (FACT-Cog), currently in its third version, is a questionnaire that evaluates patients' self-reported perceptions of their cognitive abilities and the effects of these cognitive changes on their HRQOL [8,9]. The FACT-Cog distinguishes itself from other available subjective neuropsychological tests because the questionnaire focuses on the noticeability and functional interference of the multiple specific domains associated with perceived cognitive functioning. The FACT-Cog has been used in several studies to assess the presence of subjective cognitive deficits in patients with cancer [1,10–13]. There is currently limited data on psychometric properties of the FACT-Cog. An older version of the FACT-Cog (version 2) was validated within the hematopoetic stem cell transplant population [13]. The FACT-Cog (version 3) is available in French, and it has yielded good linguistic validation results within French patients with cancer

[14]. The current English and Chinese versions of the FACT-Cog, however, have not been validated for use in research and clinical settings within the Asian population with breast cancer. Specific research on the reliability and other measurement properties of the Chinese version of the FACT-Cog has also not been published in the literature.

Because there is evidence in the literature to show that ethnicity, language, and cultural preferences can influence patients' perception of cognitive functioning [5,15], the validation of the English and Chinese versions of the FACT-Cog within Asian patients with breast cancer is essential to determine whether its results can be used with confidence as a reliable instrument in future epidemiological studies and clinical trials. Establishing the equivalence between the English and Chinese versions of the FACT-Cog will also allow the results from both languages to be pooled for future research. Hence, we designed this study to evaluate the validity of the English and Chinese versions of the FACT-Cog in the context of a multiethnic Asian population with breast cancer, and to determine the measurement equivalence between these two versions.

Methods

Study and Setting

This prospective study was conducted at the outpatient clinics of the National Cancer Centre Singapore from November 2010 to August 2012. The National Cancer Centre Singapore is the largest ambulatory cancer center in Singapore and treats 70% of the annual cancer population. This study was approved by the Singhealth Institutional Review Board.

Patients

The patients who were recruited to participate in this study were histologically diagnosed with breast cancer by a medical oncologist, were at least 18 years old, were ambulatory in nature (defined as having an Eastern Cooperative Oncology Group performance status score of 0 or 1), spoke English or Chinese as their mother tongue, and were willing to give informed consent. Patients were excluded from the study if breast cancer was a secondary malignancy, or patients presented with evidence of brain metastasis, psychosis, or any underlying neuropsychiatric illness that might impair their cognitive abilities. Patients' medical histories and medication records (extracted from a comprehensive in-house database) were reviewed to ensure that they had not been prescribed neuropsychiatric or psychotropic medications. Patients were classified into English-speaking and Chinese-speaking on the basis of their indicated mother tongue or preferred choice of language for routine reading (e.g., newspapers and books), writing, and communication. Eligible patients were recruited from the outpatient clinics to ensure a heterogeneous and representative sample of patients (in terms of treatment status and time since diagnosis of cancer) for this validation study.

Study Procedures

The patients' demographic and medical information was obtained from the existing electronic databases available at the National Cancer Centre Singapore. Data on patients' cancer treatment, chemotherapy protocol, and the use of complementary alternative medicine such as traditional Chinese medicine and vitamins or other nutritional products were also collected. Three questionnaires—the FACT-Cog, the European Organization for Research and Treatment of Cancer Quality of Life Core Questionnaire 30 (EORTC-QLQ-C30) cognitive functioning scale, and the Beck Anxiety Inventory (BAI)—were administered to patients by interviewers on recruitment. English and Chinese versions were available for all questionnaires, and these were administered to the English-speaking and Chinese-speaking groups, respectively. All interviewers were bilingual and underwent training to ensure consistency in questionnaire administration.

Tools

FACT-Cog

The FACT-Cog contains 37 items, with subscales created by the developers consisting of 1) patients' perceived cognitive impairments, 2) perceived cognitive abilities, 3) noticeability or comments from others, and 4) impact of cognitive changes on quality of life [16]. A global or summary score is obtained by summing all the item scores. Given that our focus here was to examine the psychometric properties and measurement equivalence of the FACT-Cog based on its cognitive domains, items in subscales 1) and 2) were regrouped into their cognitive domains before data analysis, according to the developer's original classifications and the expertise of a neuropsychologist in our research team [9,17]. This approach was adopted so as to facilitate the mapping of patient-reported cognitive outcomes from the FACT-Cog with the individual cognitive domains of objective neuropsychological test performances in future studies [18,19]. Hence, this study involved the validation of subscales 3) and 4) and the six reclassified cognitive domains of interest: mental acuity, attention and concentration, memory, verbal fluency, functional interference, and multitasking ability (Table 1). The items are rated for the previous week, including the day of administration. Each item is rated on a five-point Likert scale, ranging from 0 ("Never" or "Not at all") to 4 ("Several times a day" or "Very much"). The total score for the FACT-Cog can range from 0 to 148 points, with a higher score indicative of better perceived cognitive functioning.

The English version of the FACT-Cog was translated into simplified Chinese by investigators proficient in both languages. The translation closely followed the guidelines stipulated by the Translation and Cultural Adaptation-Principles of Good Practice [20]. The questionnaire was forward- and backward translated, reconciled by independent parties, and underwent cognitive pretesting with a representative and culturally homogeneous sample of 30 bilingual Singaporean patients to identify items that were offensive and/or structurally difficult to understand within the local context [5,20]. The final reconciled version was approved by the Functional Assessment of Chronic Illness Therapy.

The EORTC-QLQ-C30

The EORTC-QLQ-C30 (referred to as QLQ-C30 hereafter) is a questionnaire developed to assess cancer patients' HRQOL [21]. It contains 30 items that are grouped into five functional domains (physical, role, cognitive, emotional, and social), three symptom domains (fatigue, pain, and nausea/vomiting), a global quality-of-life domain, and six individual items (dyspnea, insomnia, anorexia, diarrhea, constipation, and financial stability). Items are rated for the previous week, including the present day. Each of the items, with the exception of the global quality-of-life domain, is rated on a four-point Likert scale, ranging from 1 ("Not at all") to 4 ("Very much"). The global quality-of-life domain is rated on a seven-point Likert scale, with 1 being "very poor" and 7 being "excellent." The score for each domain ranges from 0 to 100 points. Higher scores in the functional and global quality-of-life domains are indicative of better functioning or health status, while higher scores in the symptom domains and individual symptom items are indicative of worse symptoms. Both the English and Chinese versions of the QLQ-C30 have been validated within the cancer population in Singapore [22].