Measuring the Functional Impact of Fatigue: Initial Validation of the Fatigue Impact Scale

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The fatigue impact scale (FIS) was developed to improve our understanding of the effects of fatigue on quality of life. The FIS examines patients' perceptions of the functional limitations that fatigue has caused over the past month. FIS items reflect perceived impact on cognitive, physical, and psychosocial functioning. This study compared 145 patients referred for investigation of chronic fatigue (ChF) with 105 patients with multiple sclerosis (MS) and 34 patients with mild hypertension (HT). Internal consistency for the FIS and its three subscales was >.87 for all analyses. Fatigue impact was highest for the ChF group although the MS group's reported fatigue also exceeded that of the HT group. Discriminant function analysis correctly classified 80.0% of the ChF group and 78.1% of the MS group when these groups were compared. This initial validation study indicates that the FIS has considerable merit as a measure of patients' attribution of functional limitations to symptoms of fatigue.

Fatigue is one of the most common symptoms reported by patients in general medical practice [1]. It is recognized as a serious and disabling symptom in many chronic illnesses, including multiple sclerosis (MS) and systemic lupus erythematosus [2]. In a previous survey of patients attending the Dalhousie MS Research Unit (Halifax, Nova Scotia, Canada) [3], 27% reported that fatigue was a persistent symptom, while 40% listed fatigue as their most serious symptom. In a later study, we used a simple rating of current fatigue severity, derived from a subscale of the profile of mood states [4], and found that ratings of fatigue correlated significantly with self-reported mental health status in a sample of 105 patients with MS [5]. Despite the prevalence and significance of fatigue in many chronic illnesses and the emergence of chronic fatigue (ChF) syndrome as a major issue for health care, relatively few instruments with established psychometric properties are available to measure the subjective experience of fatigue. The urgent need for such a measure cannot be overstated. Klonoff [6], in a recent review of ChF syndrome, cited the inadequacy of "objective tools to assess severity of illness, functional limitations, and response to therapy" as one of the major obstacles to research. Ray et al. [7] have pointed out that existing mood inventories and multidimensional measures of health status have limited application to patients who experience fatigue as their primary symptom. To improve our understanding of the effects of fatigue on the lives of patients with chronic disease, we developed a more detailed measure for assessing the problems in patients' quality of life that they attribute to their symptoms of fatigue. This measure was designed as a specific health status measure according to the taxonomy of Guyatt et al. [8].

In constructing the fatigue impact scale (FIS), we adopted the viewpoint expressed by the Canadian MS Research Group [9] that "measuring the effect of fatigue on activities . . . is more sensitive than simply asking patients to rate fatigue." A similar perspective has been presented by Monks [10], who emphasized that symptoms must be considered in terms of the patient's own expected activity levels and relationships and compared with those situations in which these expectations are not met. Thus, in constructing the FIS, we chose to examine patients' perceptions of the functional limitations that they attributed to their symptoms of fatigue. A period of the past month was chosen for the scale to provide a measure that could be used to examine changes in patients' perceptions over time while also allowing for a reasonable period in which judgments about the impact of fatigue could be made. Items for the FIS were selected on the basis of existing fatigue questionnaires [2, 11] and interviews with 30 patients with MS from our previous study in which these patients were asked to describe the ways in which fatigue had affected their lives. These interviews were recorded on audiotape, transcribed, and sorted into thematically similar groupings. The FIS was constructed to include three subscales to assess perceived fatigue impact on cognitive functioning (10 items), physical functioning (10 items), and psychosocial functioning (20 items). The grouping of the items

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All subjects provided informed consent for their participation in this study in accordance with the procedures approved by the Research Ethics Committees of Camp Hill Medical Centre and the Victoria General Hospital.

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into subscales reflected the interview responses as well as dimensions established in other health status and "quality of life" assessment instruments [12, 13]. The FIS is a self-report instrument in which subjects are asked to rate the extent to which fatigue has caused problems for them in relation to exemplar statements (0 = no problem to 4 = extreme problem, maximum FIS score = 160). Computer analysis of the "readability" [14] of the scale was conducted, and preliminary versions of the FIS were modified to ensure that the reading level required to complete the FIS was less than grade 8. The items of the FIS are presented in the Appendix, grouped according to their inclusion in the cognitive, physical, and psychosocial subscales and with their original scale item number indicated. In the initial validation study described below, we examined the internal consistency of the FIS, its ability to distinguish between different patient groups, and the relationship between scores on the FIS and generic health profile measures of quality of life [8].

Methods

Subjects

The study sample included 145 patients referred to the Infectious Disease Unit of the Victoria General Hospital (Halifax) over an 18-month period for investigation of ChF. This group included 116 females and 29 males whose mean age was 37.8 years (SD = 10.8). All patients reported fatigue symptoms for at least the past 6 months, and the mean duration of fatigue symptoms was 46.8 months. These patients had been referred to the Infectious Disease Unit primarily by their family physicians.

Two comparison groups were also included in the study. One group included patients who were not expected to report significant fatigue problems, whereas the second comparison group included patients for whom fatigue was expected to be a problem. The first comparison group included 34 patients with mild hypertension (HT) who attended the Hypertension Unit of the Camp Hill Medical Centre (Halifax). This group included 17 females and 17 males whose mean age was 47.1 years (SD = 9.0). Inclusion in the mild hypertension group required diastolic blood pressure readings that ranged between 90 and 105 mm Hg on regular clinic visits. The second comparison group included 105 patients with clinically definite (90) or probable (15) MS who attended the Dalhousie MS Research Unit at Camp Hill Medical Centre. This group included 84 females and 21 males whose mean age was 42.5 years (SD = 11.6).

Measures

The construction of the FIS is described above, and the FIS items are included in the Appendix. Each patient also completed the sickness impact profile (SIP) [12] so that the relationship between the patients' reports of the effects of their fatigue symptoms and their ratings of their general health status could be examined. The SIP, a generic health profile measure [8] that focuses on dysfunction, has been used with a variety of clinical populations. It includes 136 items that are grouped into 12 categories that include body care and movement, ambulation, mobility, eating, work, home management, recreation and pastimes, social interaction, emotional behavior, communication, alertness behavior, and sleep and rest. The SIP requires patients to endorse items that apply to them and are related to their state of health. Each item receives a weighted score, and a total score is calculated with the range of scores being 0 (no dysfunction) to 100 (maximal dysfunction).

Procedures

The study was described to all patients with ChF at the time of their regular clinic visit, and informed consent for their participation was obtained at that time. Each patient with ChF was then provided with a packet of questionnaires, including the FIS and the SIP, that were to be filled out and returned by prepaid mail. Of the 166 packets that were distributed, 145 (87%) were returned. All patients from the two comparison groups were also recruited during regular clinic visits. Since these patients were participating in a larger study that often included additional neuropsychological testing, they completed the FIS, SIP, and several other psychosocial measures during visits to their homes by a research assistant.

Results

Internal consistency (Cronbach's α) of the FIS was examined for the entire sample (n = 284) as well as for the three patient groups. The internal consistency of the cognitive, physical, and psychosocial subscale items was also examined independently for the total patient sample and for each patient group. For all analyses, the internal consistency of the FIS was very high. Cronbach's α for all FIS items in the total patient sample was .98, and all subscale items by group examinations yielded a Cronbach's α that was >.87.

To examine the ability of the FIS to discriminate between the three patient groups, we compared the total scores for the three groups with a General Linear Models (SAS Institute, Cary, NC) analysis of covariance. Patient age, gender, education, and diagnostic group were included as independent variables in this analysis. No significant interactions between independent variables were found, and only the group effect was statistically significant (F = 63.7, $P < .001$). Pairwise comparisons demonstrated significant differences between all three groups ($t > 5.3$, $P < .0001$ for all comparisons). A multivariate analysis of covariance was conducted using the same independent variables with the cognitive, physical, and psychosocial subscale scores as dependent variables. Once

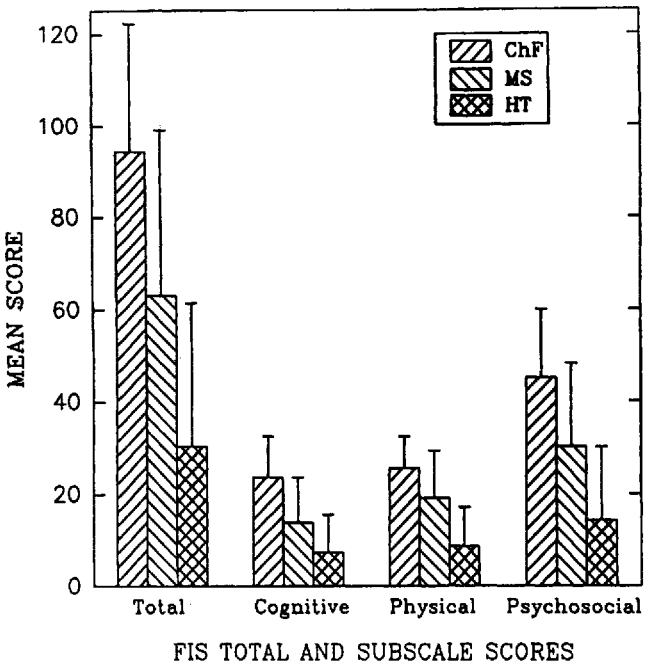

Figure 1. Means and SDs of the FIS total score and the cognitive, physical, and psychosocial subscale scores for the groups of patients with chronic fatigue (ChF), multiple sclerosis (MS), and hypertension (HT).

again, no significant interactions between independent variables were found, and only the main effect of group was significant (Wilk's Lambda = 0.650, $P < .0001$). Univariate analyses for each subscale also revealed significant group effects ($F > 53.0$, $P < .0001$ for all comparisons), and all pairwise comparisons of the subscale scores between groups yielded significant differences ($t > 3.8$, $P < .001$ for all comparisons). As expected, the greatest fatigue impact was reported by patients presenting for investigation of ChF, although patients with MS also reported significant problems associated with fatigue. These data are summarized in figure 1.

A further examination of the manner in which responses to the items of the FIS differed for the three groups was conducted via stepwise discriminant function analyses (BMDP Statistical Software, Los Angeles) with α set to .05 for entry. The first analysis compared the ChF with the HT group. A discriminant function based on four items, three from the physical subscale (items 13, 14, and 38) and one from the cognitive subscale (item 5), correctly classified 90.3% of the ChF group, 79.4% of the HT group, and 88.3% of the ChF/HT sample. The second analysis compared the ChF group with the MS group. A discriminant function based on seven items, four from the physical subscale (items 10, 14, 31, and 38), two from the cognitive subscale (items 1 and 30), and one from the psychosocial subscale (item 9), correctly classified 80.0% of the ChF group, 78.1% of the MS group, and 79.2% of the ChF/MS sample. ChF classification was associated with higher scores on items that reflected decreased motivation to do physical activities, needing frequent and longer rest periods, feeling less alert, difficulty organizing thoughts, and interference with planned activities. MS classification was associated with higher scores on items that reflected feeling more clumsy and uncoordinated when fatigued and being less able to complete tasks that require physical effort.

The general health status of the three patient groups was compared by subjecting the SIP total scores to a General Linear Models (SAS) analysis of covariance. Patient age, gender, education, and diagnostic group were included as independent variables. No significant interactions between independent variables were found, and only the group effect was statistically significant ($F = 20.31$, $P < .0001$). Pairwise comparisons demonstrated no significant difference between the SIP total scores for the ChF group (mean = 18.1, SD = 10.1) and the MS group (mean = 17.8, SD = 11.0), whereas the scores for the HT group (mean = 6.2, SD = 7.3) were significantly lower than those for both the ChF and MS groups ($t > 5.8$, $P < .0001$ for both comparisons).

Finally, we examined how the patients' attribution of functional limitations to their symptoms of fatigue related to their overall ratings of general health status. To do this, we calculated an adjusted SIP total score that excluded the contribution of the alertness behavior and sleep and rest categories. This adjusted SIP total score was used because the alertness behavior and sleep and rest categories were believed to have overlapped in the domain of functioning assessed by the FIS (e.g., "I do not keep my attention on any activity for long" and "I spend much of the day lying down in order to rest"). Thus, elimination of these categories was necessary to ensure that we were not comparing redundant measures. Correlations between the adjusted SIP total score and the FIS total score were statistically significant for each of the ChF ($r = .57$, $P < .001$), MS ($r = .53$, $P < .001$), and HT ($r = .55$, $P < .005$) groups. Stepwise multiple regression analyses (SPSS, Chicago), with α set to .05 for entry, were also conducted for each of the three patient groups with the adjusted SIP total score included as the dependent variable and the scores on the 40 FIS items included as independent variables. This analysis for the ChF group yielded a regression model with an adjusted R^2 value of .35 that included three FIS items, one from each of the cognitive (item 30), physical (item 17), and psychosocial (item 28) subscales. The adjusted R^2 value for the regression model for the patients with MS was .44, and this equation included one item from each of the cognitive (item 6) and physical (item 37) subscales and two items from the psychosocial subscale (items 8 and 16). The equation for the patients with HT included only one item (item 14), which was from the physical subscale, and the regression model with use of this item alone resulted in an adjusted R^2 value of .40.

Discussion

This initial validation study indicates that the FIS has considerable merit as an assessment instrument for the evaluation of fatigue. The FIS proved to be an easily administered self-report instrument that provided considerable information about patients' attributions of functional limitations to their symptoms of fatigue. The high internal consistency of the FIS suggests that it provides an internally valid measure of the construct of impact of fatigue on quality of life. The external validity of the FIS was evident in its ability to distinguish between divergent patient groups on the basis of both summary scores and individual item responses. Of particular importance was the finding that patients presenting for investigation of ChF differed from another patient group (those with MS) for whom fatigue is known to be a prevalent and serious problem [2, 3, 11], in both overall ratings of fatigue impact and responses to individual FIS items. The nature of the functional limitations attributed to fatigue symptoms varied sufficiently between the patients, thus allowing for a high rate of correct group classification. These findings indicate that the FIS can be used to identify ways in which symptoms of fatigue affect patients' lives that are characteristic of different patient groups. This information may ultimately be used in the design of specific intervention strategies aimed at reducing the impact of fatigue.

Our findings also point out the need to use both generic and specific instruments for measuring quality of life in patients with ChF since the limitations of both generic (i.e., SIP) and specific (i.e., FIS) quality of life measures [8] were evident. Generic health profile summary scores have the advantage of allowing comparisons of the extent of dysfunction between different groups. In the current study, the ChF and MS groups did not differ in their reports of health-related dysfunction. However, generic measures fail to show how groups differ in specific areas of interest. In the current study, it was clear that although the ChF and MS groups did not differ in overall health-related dysfunction, the dysfunction attributed to symptoms of fatigue was significantly greater in the ChF group. The strength of specific quality of life measures is in their sensitivity to the area of interest, and the FIS is a specific measure of quality of life that focuses on functional limitations attributed to fatigue symptoms. However, one must also bear in mind that extrapolation from specific measures to general quality of life has limitations. The correlation and multiple regression analyses indicated that there was considerable variance in the generic quality of life measure that was not accounted for by the FIS responses, even in patients for whom fatigue was the primary presenting symptom. This was true in spite of the good relationship between fatigue-related dysfunction and overall health-related dysfunction in all three groups that were studied. Specific quality of life measures have been criticized for their lack of applicability to diverse patient groups [8]. However, given the prevalence of fatigue in the general clinical population [1], the FIS is likely to be useful across a wide range of patient groups. Undoubtedly, it will have its greatest use in patient groups such as ChF for whom fatigue is a prominent and disabling symptom.

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Appendix

The fatigue impact scale asks subjects to rate how much of a problem fatigue has caused them during the past month, including the day of testing, in reference to the statements listed below. The subject is asked to circle the appropriate response for each: 0 = no problem; 1 = small problem; 2 = moderate problem; 3 = big problem; 4 = extreme problem. The item number in parentheses following each statement indicates the order in which it is presented in the fatigue impact scale.

Cognitive Dimension

Because of my fatigue:

I feel less alert (1)
I have difficulty paying attention for a long period (5)
I feel like I cannot think clearly (6)
I find that I am more forgetful (11)
I find it difficult to make decisions (18)
I am less motivated to do anything that requires thinking (21)
I am less able to finish tasks that require thinking (26)
I find it difficult to organize my thoughts when I am doing things at home or at work (30)
I feel slowed down in my thinking (34)
I find it hard to concentrate (35)

Physical Dimension

Because of my fatigue:

I am more clumsy and uncoordinated (10)
I have to be careful about pacing my physical activities (13)

I am less motivated to do anything that requires physical effort (14)
I have trouble maintaining physical effort for long periods (17)
my muscles feel much weaker than they should (23)
my physical discomfort is increased (24)
I am less able to complete tasks that require physical effort (31)
I worry about how I look to other people (32)
I have to limit my physical activities (37)
I require more frequent or longer periods of rest (38)

Social Dimension

Because of my fatigue:
I feel that I am more isolated from social contact (2)
I have to reduce my workload or responsibilities (3)
I am more moody (4)
I work less effectively (this applies to work inside or outside the home) (7)
I have to rely more on others to help me or do things for me (8)
I am more irritable and more easily angered (12)
I am less motivated to engage in social activities (15)
I have few social contacts outside of my own home (19)
normal day-to-day events are stressful for me (20)
I avoid situations that are stressful for me (22)
I have difficulty dealing with anything new (25)
I feel unable to meet the demands that people place on me (27)
I am less able to provide financial support for myself and my family (28)
I engage in less sexual activity (29)
I am less able to deal with emotional issues (33)
I have difficulty participating fully in family activities (36)
I am not able to provide as much emotional support to my family as I should (39)
minor difficulties seem like major difficulties (40)
I have difficulty planning activities ahead of time (9)
my ability to travel outside my home is limited (16)

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