

**FATIGUE IN CANCER PATIENTS TREATED BY EXTERNAL
RADIOTHERAPY**
An Application of The Revised Piper Fatigue Scale in Malay

Hasanah Che Ismail¹, Biswa Mohan Biswal²

Malaysia Sains University, Faculty of Medical Sciences, Department of Psychiatry¹,
Radiotherapy-Oncology²

Fatigue is commonly associated with cancer and its therapy. The assessment of fatigue became increasingly important in cancer patients, as clinical interview may not indicate the severity of fatigue. Subjective assessment of fatigue in multi-dimensions indicates the level of severity of fatigue clearly to therapist, and the scores can be used to monitor response to cancer therapy. This study showed that the Revised Piper Fatigue Scale in Malay is a reliable and valid assessment tool. In 112 patients receiving external radiotherapy for various cancers, there was no significant difference of fatigue levels between gender and age ranges. Fatigue was significantly worse in nasopharyngeal carcinoma on radiotherapy, presumably due to higher dose of radiation.

Key words: Fatigue, cancer, radiotherapy, Piper Fatigue Scale, validation

INTRODUCTION

Fatigue and tiredness may be mentioned interchangeably in conversation, but clinically, fatigue is more pervasive in nature, described as an unusual sense of tiredness not usually relieved by either a good night's sleep or rest. Tiredness or acute fatigue is protective in function and time limited (1).

Different to the protective function of acute fatigue, chronic or pervasive fatigue complicate many type of disorders and their therapy. In both forms, i.e. either as symptoms of primary illness or complication of therapy, fatigue caused distress, disturbed functions and impaired quality of life of cancer patients. Fatigue is one of the most common complaints of people with cancer (2). Fatigue exists in 14% to 96% of people with cancer (3,4).

The etiology of cancer-related fatigue (CRF) is not specifically known, but had been postulated as caused by inflammatory cytokines or tumor necrosis factor resulting in muscle wasting. Also, a major side effect of chemotherapy and radiotherapy is extreme fatigue that compromised quality of life.

Thus addressing and assessing degree of fatigue in cancer patients is important at any stage of the illness. It will not only indicate the level of distress and quality of life of the patients but also indicate the need for adjunct or complementary therapy like supervised exercise (5) or dietary supplement (6).

The increasing claims of effectiveness of different types of complementary therapies, makes it more important to have an acceptably comprehensive assessment of fatigue as evidence of efficacy of each therapy. There have been several fatigue scales that are available for research trials: Symptom Distress Scale (7), Fatigue Scale and Fatigue Observation Checklist (8), Piper's Fatigue Self-Report Scale (9) Lee's Visual Analog Scale for Fatigue (10), Fatigue Severity Scale (11) the Multidimensional Fatigue Inventory (MF1-20) (12), and Pugh's work (13).

Differing definitions and theoretical framework within which fatigue is being studied results in differing assessment tools. The measure of fatigue was probably tailored to the illness and culture in which fatigue is studied, thus limiting generalization. There is no gold standard or best tool for fatigue assessment, and selection of assessment tool should be appropriate with study design, illness being studied and the objectives of the study. The ideal tool should be simple to complete, self-rating, valid, reliable, and multidimensional.

Correspondence: Dr. Hasanah Che Ismail MBBS, MPM
Head Department of Psychiatry
School of Medical Sciences
Universiti Sains Malaysia
16150, Kota Bharu
MALAYSIA
E-mail: hasanah@kb.usm.my

Table 1. Characteristics of patients

		Patients	
		No	%
Age	<30	22	19.6
	31-50	37	33
	51-70	36	32.1
	>70	17	15.2
Sex	male:49		
	female: 63		
Diagnosis			
	Nasopharyngeal	32	28.6
	Breast	19	17
	Ovary, servix, vagina	19	17
	GIT and GUS	13	11.6
	Brain	9	8
	Miscellaneous	20	17.9

* *Gastrointestinal and Genitourinary*

This described the revised Piper Fatigue Scale (PFS) which has been used quite commonly and widely (14). Piper Fatigue Scale was also widely used in studies on cancer related fatigue, assessing the effect of fatigue on four dimensions or aspects i.e. behavioural/severity, affective meaning, sensory and cognitive/mood. Though it is exceptionally lengthy, it provides more information about the effect of fatigue on its sufferers, and how certain measures or therapy specifically affect various dimensions.

Thus the aim of the present study was to demonstrate the validity and reliability of the revised Piper Fatigue Scale in Malay, and to identify the fatigue dimensions that are affected in cancer patients receiving external radiotherapy.

MATERIAL AND METHODS

Subjects

Consecutive cancer patients who completed the third course of radiotherapy in radiotherapy and oncology unit in Hospital University Sains Malaysia, Malaysia, were approached and asked to participate. Eligible patients are those who received radiotherapy with curative intention.

These are patients who had undergone surgery for removal of the cancer from the primary site except for nasopharyngeal carcinoma that were predominantly treated with radiotherapy.

Table 3. Scale reliability; internal consistency of revised PFS

Dimensions	Items	Cronbach α
Behavioural severity	6	0.87
Affective meaning	5	0.94
Sensory	5	0.87
Cognitive/mood	6	0.86
Total	22	0.95

These patients received conventional fractional radiotherapy with 2 Gy/day fraction, receiving treatment for 5 days a week for 5 to 7 weeks period using a 6 MV linear accelerator.

All patients were assessed on the completion of the third week of therapy. Hundred and twelve patients, who came for radiotherapy in the year 2000 and 2001, fulfilled these criteria and were included in the study. The gastrointestinal tract (GIT) cancer and genitourinary tract (GUT) cancer were combined in analysis to improve the sample size in each category of analysis.

Questionnaire

Fatigue was measured with the revised PFS. The revised PFS has 22-item visual analog scales that measures four dimensions of subjective fatigue (behavioural/severity, affective meaning, sensory and cognitive/mood). In addition, open-ended questions explore the subject's perceptions of the causes of fatigue and effective relief measures.

Permission sought from the original author of Piper Fatigue Scale for translation to Malay language. A bilingual reviewer for best translation and resolution of uncertainties reviewed two forward translations by bilingual panel that is native and fluent in both Malay and English languages. Another bilingual person who had never seen the original questionnaire back translated the final version. The back-translation was further reviewed by the bilingual reviewer, resolving the discrepancies.

Statistical analysis

Data from the study was analysed by SPSS 11 for window. Categorical data was analysed by chi-square and numerical with independent samples t-test.

Table 2. Means of each dimension of revised PFS for different types of cancers

	Nasopharyngeal	GIT and GUS**	Breast	Miscellaneous
Behavioural severity	5.2±1.9*	4.4±2.2	3.5±2.2	3.4±2.3
Affective meaning	4.8±2.3*	3.9±2.8	3.3±2.1	3.2±1.7
Sensory	4.2±1.9	3.7±2.2	3.4±2.1	3.5±2.2
Cognitive/mood	3.5±1.7*	2.4±1.5	3.0±1.8	2.7±1.6

*t test $p < 0.05$ compared with other cancers, **Gastrointestinal and Genitourinary

Table 4. Principal component analysis of all items with visual analog scales into its original dimensions

Items	Behavioural severity	Affective meaning	Sensory	Cognitive/Mood
F2	0.40	0.68		
F3	0.57			
F4	0.61			
F5	0.80			
F6	0.67			
F7	0.40		0.70	
F8		0.68		
F9		0.83		
F10		0.75		
F11		0.80		
F12		0.81		
F13			0.80	
F14			0.50	
F15			0.60	
F16			0.75	
F17			0.64	
F18				0.64
F19				0.65
F20		0.72		0.34
F21			0.56	0.46
F22				0.80

Table 5. Significant differences in scores of all dimensions and total average score of revised PFS with depressive categories

	No D. ^a n:16	Mild D. ^b n:44	Moderate D. ^c n:42	Major D. ^d n: 10
Behavioural severity	2.46±2.36	3.38±1.84	5.09±1.93	6.48±1.55
Affective meaning	1.16±1.31	3.04±1.28	4.73±1.71	7.32±2.34
Sensory	1.55±1.75	3.12±1.53	4.66±1.79	5.40±1.88
Cognitive /mood	0.44±1.20	3.00±1.14	4.64±1.37	5.81±1.41
Total	1.41±1.20	3.00±1.14	4.64±1.37	5.81±1.41

for all dimensions and total average scores; *t* test between a and b <0.0001, b and c <0.0001, c and d <0.05

Table 6. Radiation dose according to different types of cancers (mean±SD)

Discode	n	Mean
Miscellaneous	20	3104±1333
Breast	19	4479±474
Ovary, servix, vagina	19	3807±1306
NPS	32	4561±1224
GIT and GUS	13	4430±897
Brain and nerves	9	3522±1364

RESULTS

Hundred and twelve patients participated in this study. The mean score of each dimension with different types of cancer are as shown in Table 2. There was no significant difference in each dimension for the age groups and gender. There was also no significant difference in fatigue between those who only received radiotherapy or those who have received a combination of radiotherapy and chemotherapy. In all cancer types, the dimension worst affected was behavioural/severity, followed by affective meaning, sensory and cognitive/mood. Patients with nasopharyngeal cancer were significantly worse in scores for the behavioural, affective and cognitive/mood domain (Table 2).

Revised Piper Fatigue Scale Malay version showed a highly satisfactory internal consistency (Table 3). Cronbach α values ranged from 0.86 for cognitive/mood, to 0.94 for affective meaning, and 0.95 for the total 22 items. The question scores of the respondents on all 22 items ranged from 0 to 10 with normal distribution.

Exploratory factor analysis using principal component method, extracting 4 factors with varimax rotation showed that all items remained in its original construct, except for item 20 (Table 4). Item 20 asks, "To what degree are you now feeling: from exhilarated to depressed", fell into the affective meaning dimension and only showed poor reliability (0.34) with other items in its original cognitive/mood dimension.

Further, item 20 was taken as assessment for depression. This item assessed patients on the range of exhilaration (0) to most severe depression (10). Categories of depression according to the severity code (14) of 0=none, 1-3=mild, 4-6=moderate and 7-10=severe/major allowed comparisons of dimension scores and average total score with the depressive categories.

The level of fatigue as assessed by revised PFS showed significant differences between patients who were not depressed and those with mild, moderate or severe depression (Table 5).

DISCUSSION

The result of this study showed that the revised Piper Fatigue Scale showed good scale behaviour, good reliability, i.e. highly satisfactory internal consistency and satisfactory construct validity on factor analysis.

Unfortunately the ability of the scale to show significant differences of fatigue, at different stages of treatment, i.e. before therapy, in the midst of therapy or on completion could not be demonstrated. This is limited by the study design that took only one cross-sectional assessment of each patient during the end of the third course of radiotherapy.

There were no significant differences of the fatigue dimensions scores between gender and age ranges. However there were significant differences in behavioural severity, affective meaning and cognitive/mood dimensions of nasopharyngeal carcinoma (NPC) compared to other types of cancers. The higher radiation doses received by patients with NPC compared to other types of cancer could be the cause to the significantly more severe fatigue, even when the radiation doses between different cancers were not significantly different (Table 6).

Categorizing the scores for item 20 into severity of depressive feeling showed that fatigue ratings in all four dimensions are discriminative between each level of depressive severity. This is rather a crude way of assessing depression, which may not be enough to infer that depression is a significant association with fatigue. Fatigue could either be the result of depression or depression the result of fatigue that impaired daily functioning and quality of life. It would be very difficult to determine which disturbance is primary, but this fatigue when improved with a trial of antidepressant should suggest the first association.

Low radiotherapy doses across the different types of cancer probably explained the mild to moderate fatigue noted in this study. A higher radiation doses for NPC, though not statistically different with radiation doses for other cancers results in significantly more severe level of fatigue in behavioural/severity, affective meaning and sensory dimensions.

This study showed that multidimensional assessment of fatigue translated to Malay language is valid and reliable. With translation and validation in the target population the revised PFS still retained its original construct. The dimensions are affected differently and the pattern seen in our patients is worst level of fatigue in behavioural/severity dimension, followed by the affective meaning. Fatigue is also associated with level of depressive mood.

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