Comparing the Fukuda et al. Criteria and the Canadian Case Definition for Chronic Fatigue Syndrome

Leonard A. Jason, PhD
Susan R. Torres-Harding, PhD
Amber Jurgens, BA
Jena Helgerson, BA

ABSTRACT. Because the pathogenesis of Chronic Fatigue Syndrome (CFS) has yet to be determined, case definitions have relied on clinical observation in classifying signs and symptoms for diagnosis. The selection of diagnostic signs and symptoms has major implications for which individuals are diagnosed with CFS and how seriously the illness is viewed by health care providers, disability insurers and rehabilitation planners, and patients and their families and friends. Diagnostic criteria also have implications for whether research based on varying definitions can be synthesized. The current investigation examined differences between CFS as defined by Fukuda et al. (1994) and a set of criteria that has been proposed for a clinical Canadian Case definition. There were twenty-three participants who met the Canadian criteria, 12 in the CFS (Fukuda et al. (7) criteria) group and the 33 from the chronic fatigue (CF)-psychiatric group. Dependent measures included: work status, psychiatric comorbidity, symptoms, and functional impairment (measured by the Medical Outcomes Study). People meeting the Fukuda et al. and

Leonard A. Jason, Susan R. Torres-Harding, Amber Jurgens, and Jena Helgerson are affiliated with DePaul University.

Address correspondence to: Leonard A. Jason, PhD, Center for Community Research, DePaul University, 990 West Fullerton Avenue, Chicago, IL 60614 (E-mail: ljason@depaul.edu).

Financial support for this study was provided by NIAID grant number AI36295.

Journal of Chronic Fatigue Syndrome, Vol. 12(1) 2004
http://www.haworthpress.com/web/JCFS

Digital Object Identifier: 10.1300/J092v12n01_03

Canadian criteria were compared with people who had a chronically fatiguing illness explained by a psychiatric condition. Statistical tests used included binomial logistic regression and analysis of variance. The Canadian criteria group, in contrast to the Fukuda et al. criteria group, had more variables that statistically significantly differentiated them from the psychiatric comparison group. Overall, there were 17 symptom differences between the Canadian and CF-psychiatric group, but only 7 symptom differences between the CFS and CF-psychiatric group. The findings suggest that both the Canadian and Fukuda et al. case definitions select individuals who are statistically significantly different from psychiatric controls with chronic fatigue, with the Canadian criteria selecting cases with less psychiatric co-morbidity, more physical functional impairment, and more fatigue/weakness, neuropsychiatric, and neurological symptoms.

KEYWORDS. CFS, ME, Canadian, Fukuda et al., diagnostic criteria

INTRODUCTION

Chronic Fatigue Syndrome (CFS) is an illness that involves neurological, immunological, and endocrinological system pathology (1-3). In 1988, Holmes et al. (4) constructed the first US working case definition of CFS. It required a new onset of fatigue lasting a minimum of six months, accompanied by at least eight of 11 specified symptoms. However, problems emerged in doing research with this case definition, Katon et al. (5) found that patients with CFS were indistinguishable from those with chronic fatigue who did not meet the 1988 Holmes et al. criteria (4). Another concern with the original CFS criteria was that the requirement of eight or more minor symptoms could inadvertently select for individuals with psychiatric problems (6).

These difficulties were influential in the development of a revised US case definition for CFS by Fukuda and associates (7). In this revised 1994 case definition, a patient must experience chronic fatigue of a new or definite onset, which has lasted for 6 or more months, not substantially alleviated by rest, not the result of ongoing exertion, and that produces significant reductions in occupational, social, or personal activities. The 1994 criteria also require the concurrent occurrence of at least four

of eight specified symptoms and the exclusion of alternative medical or psychiatric explanations for the symptoms.

Several investigations have contrasted the two US CFS case definitions. Tiersky et al. (8) investigated the differences between the 1988 and 1994 case definition criteria in a study of 71 primary care patients with CFS. Participants meeting only the 1994 definition experienced a greater duration of illness than those meeting the 1988 definition. In contrast, those in the 1988 group reported greater frequency of sore throats, joint pain, tender lymph nodes, headaches, and fever. In another study, Jason, Torres-Harding et al. (9) found that the 1988 criteria, compared to the 1994 criteria, selected a group of participants with higher symptom prevalence and functional impairment, but these groups did not significantly differ in psychiatric co-morbidity.

Many patient groups in Britain, the US, and other countries have preferred to use the term Myalgic Encephalomyelitis rather than the term CFS. In 1955, there was an outbreak of Myalgic Encephalomyelitis at the Royal Free Hospital, which was described by the consultant in charge, Ramsay. In 1981 and again in 1988, Ramsay published a definition of this disease under the name Myalgic Encephalomyelitis (10). The most prominent of these criteria include: (1) fatigue after minimal exertion (not daily fatigue) and delay of recovery of muscle power following exertion; (2) one or more symptoms that indicate circulatory impairment; (3) one or more symptoms that indicate central nervous system involvement (cerebral problems); and (4) fluctuating symptoms (11,12).

Dowsett and associates' (13) criteria for ME bear some similarity to the Lloyd et al. (14) Australian case definition of CFS. Both stipulate that postexertional malaise as well as memory and concentration difficulties are central for a diagnosis. Factor analysis studies have also suggested the importance of post-exertional malaise and cognitive problems (15,16). In contrast, for the Fukuda et al. (7) criteria, both of these symptoms are optional and not required. They are among a group of eight symptoms, of which a patient must have four (17).

To date, there has only been one investigation comparing the Fukuda et al. (7) CFS criteria with the ME criteria. People meeting the ME criteria were compared with: (1) those meet who met only the Fukuda et al. (7) CFS criteria, but not the ME criteria; and (2) those whose fatigue was explained by a psychiatric illness. Those meeting the ME criteria, in contrast to those meeting the CFS Fukuda et al. (7) criteria, had poorer neurological, neuropsychiatric, fatigue/weakness, and rheumatological symptoms than those with chronic fatigue explained by psychiatric conditions (18).

Recently a new clinical case definition has been developed in Canada, and the criteria share some of the criteria of ME. The present study compared persons meeting the Canadian case definition and the Fukuda et al. (7) CFS criteria with people experiencing chronic fatigue explained by psychiatric reasons (CF-psychiatric). Because the Canadian criteria incorporated many of the primary symptoms from the ME criteria, it was hypothesized that those meeting the Canadian criteria would have more symptoms and disability than those meeting the Fukuda et al. (7) CFS criteria.

METHOD

Procedure

The data derive from a larger community-based study of CFS that was carried out in three stages (19). Stage one entailed a cross-sectional screening telephone survey of a random sample of 28,673 households, with 18,675 adults completing the screening interview (65.1% completion rate). Of these participants, 780 (4.2%) have six or more months of fatigue. Stage two involved a structured psychiatric interview for those respondents from Stage one who screened positive for CFS (i.e., six or more months of fatigue, and at least four minor symptoms based on the Fukuda et al. (7) CFS criteria). In Stage three, a physician conducted a detailed medical examination to rule out exclusionary medical conditions. A team of four physicians and a psychiatrist were responsible for making a final diagnosis with two physicians independently rating each file using the current U.S. case definition of CFS. Where physicians disagreed, a third physician rater was used (see 19). For the purpose of the present study, we focus on those 32 individuals diagnosed using the Fukuda et al. (7) definition, the 45 diagnosed with idiopathic chronic fatigue (individuals who had 3 or fewer symptoms so they did not meet the Fukuda et al. (7) CFS case definition), and the 33 with chronic fatigue explained by psychiatric reasons (CF-Psychiatric). These groups have been previously described (19).

Definitions

Fukuda et al. (7) CFS Criteria: To be diagnosed with the Fukuda et al. (7) CFS criteria, participants were required to experience persistent or relapsing fatigue for a period of six or more months concurrent with at least four of eight specific minor symptoms that did not predate the

illness. Minor symptoms of the current US case definition for CFS are sore throat, lymph node pain, muscle pain, joint pain, postexertional malaise, headaches of a new or different type, memory and concentration difficulties, and unrefreshing sleep. Furthermore, the participant had to experience substantial reductions in occupational, educational, social, or personal activities as a result of their illness. Persons found to have alternative medical or psychiatric illnesses, as defined by the Fukuda et al. (7) CFS criteria were excluded. As mentioned earlier, 32 individuals were diagnosed according to these criteria, however, 20 of them also met criteria for the Canadian case definition. The 12 who did not meet the Canadian criteria comprise the Fukuda et al. (7) CFS criteria group in the analyses below (they are referred to as the CFS group in the analyses below).

Canadian Criteria: The Canadian Clinical definition specifies that the illness persists for at least six months (20). In addition, there must be a marked degree of new onset of unexplained, persistent or recurrent physical or mental fatigue that substantially reduces activity level. Post-exertional malaise must occur with loss of physical or mental stamina, rapid muscle or cognitive fatigability, usually with twenty-four hours or longer to recover. There also needs to be unrefreshing sleep or sleep quantity or rhythm disturbance, and a significant degree of arthralgia and/or myalgia (there are a small number of patients with no pain or sleep dysfunction, and a diagnosis can only be given when these individuals have a classical case with an infectious illness onset). In addition, there needs to be two or more neurocognitive manifestations (e.g., confusion, impairment of concentration and short term-memory). Finally, there needs to be at least one symptom from two of the following categories: autonomic manifestations (neurally mediated hypotension, light headedness), neuroendocrine manifestations (e.g., recurrent feelings of feverishness and cold extremities), and immune manifestations (e.g., recurrent sore throats). In the analyses below, this group will be referred to as the Canadian criteria or group. Twenty individuals who had been diagnosed with the Fukuda et al. (7) criteria met this definition, as did three individuals from the idiopathic chronic fatigue group as defined above.

CF-Psychiatric: The third group comprised of 33 persons with a psychiatric explanation for their chronic fatiguing illness (CF-psychiatric). For example, of this group, 19 individuals were diagnosed with melancholic depression. Psychiatric conditions were diagnosed using the Structured Clinical Interview for the DSM-IV (SCID) (21), and scores obtained from this Interview are valid and reliable. This semi-structured

interview guide approximates a traditional psychiatric interview, and this interview has been used by CFS investigators in the past.

Measures

Symptom Frequency: A detailed medical questionnaire was used to assess the presence of 123 symptoms. The questionnaire, based on a measure developed by Komaroff et al. (22), asked about the presence of the eight symptoms of the Fukuda et al. (7) CFS definition and various medical and psychiatric symptoms. Participants were asked whether or not each of the symptoms had occurred over the prior six months and whether the onset of the symptoms followed onset of the chronic fatiguing illness. The definitional symptoms and the additional symptoms were then classified into the following categories: weakness/fatigue, disturbed sleep, neuropsychiatric, infectious, rheumatological, cardiopulmonary, neurological, and reproductive abnormalities.

Medical Outcomes Study: Participants completed the Medical Outcomes Study 36-item Short-Form Survey (MOS) (23,24). Scores obtained from this instrument have been found to be reliable and valid. This measure discriminates between gradations of disability, and this survey has been used by other CFS investigators. This instrument encompasses multi-item scales that assess physical functioning, role limitations, social functioning, bodily pain, general mental health, vitality, and general health perceptions. Higher scores indicate better health, lower disability, or less impact of health on functioning. Reliability and validity studies for scores obtained from the 36-item version of the MOS have shown adequate internal consistency, discriminant validity among subscales, and substantial differences between patient and nonpatient populations in the pattern of scores (25-27). The MOS Physical Composite Score (PCS) and Mental Composite Scores (MCS) were utilized in the present investigation as combined measures of the eight MOS subscales to rate overall impairment of function (28). These PCS and MCS scores have appropriate validity and reliability as well as sensitivity and specificity in discriminating the gradations of health status among groups (29).

Fatigue: The Fatigue Scale (30) provides a continuous distribution of fatigue scores. Despite its brevity, scores from this scale were found to be reliable and valid, possessing good face validity and reasonable discriminant validity. The 11-item scale has responses rated on a four-option continuum; total scores range from 0-33 (with higher scores sig-

nifying greater fatigue). This scale has been used by other CFS investigators.

Statistical Analyses

The demographic variables of gender, age, ethnicity, marital status, parental status, work status, duration of illness, and socioeconomic status were examined, using chi-square and t-tests across the three groups. Using binomial logistic regression, we first made the CF-psychiatric group as a reference group to compare it with the Canadian and the CFS criteria. We next compared the CFS group with the Canadian case definition and the CF-psychiatric group. For MOS and Chalder scores, analysis of variance and Bonferroni post hoc analyses were conducted.

RESULTS

Canadian vs. CFS(1994) vs. CF-Psychiatric

The twenty-three participants who met the Canadian criteria were compared to the remaining 12 in the CFS (Fukuda et al. (7) criteria) group and the 33 from the CF-psychiatric group. There were no demographic differences among groups.

Symptoms

Table 1 presents fatigue/weakness, disturbed sleep, neuropsychiatric, infectious, rheumatological, cardiopulmonary, gastrointestinal, neurological, and reproductive symptoms that were different between the three groups.

Fatigue/Weakness: The Canadian criteria[1] participants reported higher general muscle weakness scores than the CF-psychiatric group. Canadian criteria participants were also more likely to report the occurrence of weakness in the neck and shoulders than the CF-psychiatric group.

Disturbed Sleep: The occurrence of trouble staying asleep was reported with greater frequency in the CFS group compared to the Canadian criteria group.

Neuropsychiatric: There were no neuropsychiatric symptom differences found when comparing the CFS group with the CF-psychiatric group. The Canadian criteria group had more neuropsychiatric symptoms when compared with the CF-psychiatric group for the following five items:[2] confusion and disorientation, difficulty retaining information,

TABLE 1. Occurrence of Significant Symptoms[1]

	Canadian Definition (N = 23)	CFS (N = 12)	CF-Psych (N = 33)	Significance
	%	%	%	
Fatigue/Weakness				
General Muscle Weakness	82.6[a]	66.7	54.5[a]	*
Neck Weak	52.2[a]	25.0	24.2[a]	*
Shoulders Weak	52.2[a]	25.0	24.2[a]	*
Back Weak	47.8[a]	33.3	18.2[a]	*
Disturbed Sleep				
Trouble Staying Asleep	30.4[c]	66.7[c]	39.4	*
Neuropsychiatric				
Confusion or Disorientation	39.1[a]	8.3	12.1[a]	*
Difficulty Retaining Information	56.5[a]	41.7	27.3[a]	*
Need to Focus on One Thing at a Time	65.2[a,c]	25.0[c]	24.2[a]	*
Slow to Process Visual and Auditory Information	30.4[a]	8.3	6.1[a]	*
Disturbances in Eyesight	43.5[a]	33.3	18.2[a]	*
Infectious				
Lymph Node Pain	34.8[a]	25.0	12.1[a]	*
Rheumatological				
Neck Muscles Ache	65.2[a]	75.0[b]	36.4[a,b]	*
Back Muscles Ache	65.2[a]	66.7	36.4[a]	*
Stiff After Sitting	39.1	58.3[b]	21.2[b]	*
Sinus Infection	4.3	41.7[b]	12.1[b]	*
Sinus Congestion	26.1	50.0[b]	15.2[b]	*
Cardiopulmonary				
Chest Pains	34.8[a]	33.3	9.1[a]	*
Gastrointestinal				
Bloating	26.1	50.0[b]	15.2[b]	*
Lower Abdominal Pain	26.1	41.7[b]	9.1[b]	*

	Canadian Definition (N = 23)	CFS (N = 12)	CF-Psych (N = 33)	Significance
	%	%	%	
Neurological				
Feel Weak or Dizzy After Standing	43.5[a]	41.7	18.2[a]	*
Dizziness When Move Head Suddenly	47.8[a]	16.7	18.2[a]	*
Alcohol Intolerance	47.8[a]	33.3	15.2[a]	*
Reproductive				
Decreased Sexual Interest/Function	30.4	58.3[b]	18.2[b]	*

[1] Italics indicate symptoms that are part of the current CFS case definition (Fukuda, et al., 1994).
[*] Using binomial logistic regression analyses, difference is statistically significant at the $p \leq .05$ level.
[a] Statistically significant difference between Canadian Definition of ME and CFS-Psychiatric groups.
[b] Statistically significant difference between CFS and CFS-Psychiatric groups.
[c] Statistically significant difference between the CFS and Canadian Definition of ME groups.
[d] Only women.

need to focus on one thing at a time, slow to process visual and auditory information, and disturbances in eyesight. In addition, the Canadian criteria group also had a higher level of symptoms for the item need to focus on one thing at a time, than the CFS group.

Infectious: The occurrence of lymph node pain was greater in the Canadian criteria group when compared with CF-psychiatric group.

Rheumatological: The CFS group in comparison to CF-psychiatric group reported more of the following symptoms: neck muscles ache, stiff after sitting, sinus infection, and sinus congestion. The Canadian criteria group in comparison to CF-psychiatric reported more neck and back muscles ache.

Cardiopulmonary: The Canadian criteria group in comparison to the CF-psychiatric group reported more chest pains.

Gastrointestinal: In comparison to the CF-psychiatric group, the CFS group had more bloating and lower abdominal pain.

Neurological: The Canadian criteria group compared to the CF-psychiatric group had higher scores for feeling weak or dizzy after standing, feeling dizzy when moving the head suddenly, and alcohol intolerance.

Reproductive: Participants with CFS reported the occurrence of decreased sexual interest/function with greater frequency than the CF-psychiatric group.

Other Measures

There were no differences between the groups on the Fatigue Scale or the Mental MOS composite score. There was a difference on the physical composite score ($F(2,51) = 3.85$, $P < .05$), with those defined by the Canadian criteria having greater functional limitations than the CF-psychiatric group (Ms = 32.5 vs. 39.9) and directionally lower scores than the CFS group (M = 37.8). Higher scores on this scale indicate better health or less impact of health on functioning.

There was no differences in psychiatric status when comparing the three groups: Canadian, CFS, and CF-psychiatric. Rates of current (χ^2 (2, N = 68) = 10.86, $P < .01$) and lifetime (χ^2 (2, N = 68) = 7.58, $P < .01$) psychiatric diagnoses differed; the Canadian group (47.8%) had lower rates of current psychiatric diagnoses than those in the CF-psychiatric group (87.9%) (χ^2 (1, N = 56) = 10.65, $P < .01$) and directionally lower rates than those in the CFS group (75.0%) (χ^2 (1, N = 35) = 2.38, $P < .05$). In addition, the Canadian group (78.3%) had lower rates of lifetime psychiatric diagnoses than those in the CF-psychiatric group (100%) (χ^2 (1, N = 56) = 7.88, $P < .01$) and directionally lower rates than the CFS group (83.3%) (χ^2 (1, N = 35) = .12, $P < .05$).

DISCUSSION

This study examined differences in sociodemographic characteristics, symptom frequency, and functional impairment with individuals meeting different diagnostic criteria sets for chronic fatigue syndrome. When samples of individuals meeting the CFS criteria were compared to the Canadian case definition, findings revealed no sociodemographic or psychiatric differences between the two samples. On measures of overall fatigue and disability, the Canadian criteria did select a group of patients with more impairment in physical functioning and did report higher levels of fatigue/weakness, neuropsychiatric, infectious, cardiopulmonary, and neurological symptoms when compared to the CF-psychiatric group. The CFS group reported more disturbed sleep, rheumatological, gastrointestinal and reproductive symptoms than the CF-psychiatric group. The Canadian and CFS criteria groups differed statistically on two items, with the Canadian criteria group reporting a greater need to focus on one thing at a time, and the CFS group reporting more trouble staying asleep.

The overall findings suggest that the Canadian clinical criteria appear to select a more symptomatic group of individuals than the CFS criteria,

and these individuals do demonstrate less current and lifetime psychiatric impairment than those selected according to the Fukuda CFS criteria. In contrast, the Fukuda CFS group was no different from the CF-psychiatric group in psychiatric impairment. Predictably, the CF-psychiatric group showed the highest frequency of current and lifetime psychiatric disorders.

Overall, there were 17 symptom differences between the Canadian and CF-psychiatric group, but only seven symptom differences between the CFS and CF-psychiatric group. It is of interest that in the prior study, when the ME criteria were utilized, there were 22 symptom differences between the ME and CF-psychiatric group, and eight symptom differences between the CFS and CF-psychiatric group (18). Findings suggest that both the ME and Canadian criteria select a group of patients with more symptoms, although the ME criteria appear to identify a group with higher rates of symptoms and the Canadian criteria identify a group with higher levels of physical functional impairment and less psychiatric comorbidity.

The Canadian group had statistically significant differences from the CF-psychiatric group primarily in the fatigue/weakness, neuropsychiatric and neurological areas, while the CFS group's differences were largely found in the rheumatological and gastrointestinal areas. Similar findings emerged when ME was compared with CFS (18). The ME group in that study and the Canadian criterion group in the present study were both different from the CF-Psychiatric on 10 symptoms: five neuropsychiatric symptoms (disturbances in the eyesight, need to focus on one thing at a time, confusion or disorientation, difficulty retaining information, slow to process visual and auditory information), two neurological symptoms (feeling weak or dizzy after standing up quickly, feeling dizzy when moving head suddenly), two fatigue/weakness items (neck weak, back weak), and one infectious symptom (lymph node pain). In contrast, in both studies, the CFS condition was different from the CF-psychiatric group on two rheumatological symptoms (sinus congestion, neck pain) and one gastrointestinal symptom (pain in the lower abdomen) and one reproductive symptom (decreased sexual interest/function). Given the importance of the weakness/fatigue, neurological and neuropsychiatric symptoms, it seems possible to conclude that the Canadian and ME criteria identify a more debilitating illness group than the CFS group.

Cardiopulmonary and neurological abnormalities have been suggested as important symptoms to consider in patients with CFS (31-33). For example, Jason et al. (34) found several cardiopulmonary and neurological symptoms (i.e., shortness of breath, chest pain, dizziness after standing, skin sensations, general dizziness, dizzy moving the head, and

alcohol intolerance) uniquely differentiated a CFS group from controls. Findings from the present study indicate that the Canadian criteria does capture many of these cardiopulmonary and neurological abnormalities, which are not currently assessed by the Fukuda et al. (7) CFS case definition.

Komaroff and associates (22) have suggested that eliminating the symptoms of muscle weakness, arthralgias, and sleep disturbance would provide greater sensitivity and specificity in CFS diagnosis. In contrast, the present investigation found that general muscle weakness did differentiate the Canadian criteria group from the CF-Psychiatric group, whereas trouble staying awake differentiated the CFS group from the CF-Psychiatric group. Komaroff and associates (22) also suggested adding anorexia and nausea as minor symptoms in the CFS case definition. However, in the present study, both occurred with relatively low frequency and neither uniquely differentiated the three groups.

Hartz and associates (35) also investigated the occurrence of symptoms in persons with fatigue, and recommended the inclusion of fever and chills, muscle weakness, and sensitivity to alcohol as CFS case definition symptoms. Results of the current investigation indicate that muscle weakness and sensitivity to alcohol uniquely differentiated the Canadian group from CF-Psychiatric, and muscle weakness in the Canadian criteria group occurred at multiple sites, with back, shoulders and neck being the most frequently reported form of weakness. There were no differences in the occurrence of fever and chills in this study.

It had been predicted that the Canadian criteria would select patients with more disability than those with the Fukuda et al. (7) CFS criteria. This small study shows that the Canadian group had higher scores than the CF-Psychiatric group, but were only directionally worse than the Fukuda et al. (7) CFS criteria group. In combination with symptom patterns, it is possible to conclude that the Canadian group does select individuals with greater impairment, particularly given the physical composite score, fatigue/weakness, neurological and neuropsychiatric symptoms, as these symptoms can interfere with daily living and occupational performance.

None of the current definitions have been empirically derived or prospectively contrasted with one another. Katon et al. (5) found that patients with CFS were indistinguishable from those with chronic fatigue not meeting the 1988 criteria. One study that has compared the 1988 criteria, British and Australian case definitions found similar laboratory abnormalities across all the definition groups (36). Studies examining sources of diagnostic unreliability have shown that subject, occasion,

and information variance account for only a small portion of diagnostic reliability (20). However, criterion variance, differences in the formal inclusion and exclusion criteria used by clinicians to classify patients' data into diagnostic categories, accounts for the largest proportion of diagnostic unreliability. The Fukuda et al. (7) CFS definition as well as the Canadian definition would be improved if more attention was devoted to developing operationally explicit, objective criteria and standardized interviews (37). A recent study by Linder et al. (17) used artificial neural network to classify patients with chronic fatigue (including CFS and idiopathic chronic fatigue), lupus erythematosus, and fibromyalgia, and were able to achieve a sensitivity of 95% and a specificity of 85%. Those chronic fatigue symptoms that had the highest accuracy were "acute onset of symptoms" and "sore throat," which supports the hypothesis of an infectious etiology.

Results from the present investigation highlight the importance of contrasting different diagnostic criteria in order to gain a greater understanding of the syndrome now known as CFS. The findings do suggest that the Canadian criteria point to the potential utility in designating post-exertional malaise and fatigue, sleep dysfunction, pain, clinical neurocognitive, and clinical autonomic/neuroimmunoendocrine symptoms as major criteria for future attempts to define this syndrome. Unfortunately, there are no published instruments specifically designed to assess many of these symptoms objectively.

It is important to carefully assess each diagnostic criterion, as the manner in which clinicians phrase their assessment questions can have serious implications. In the community epidemiology study discussed earlier (18), rates of post-exertional fatigue for individuals with CFS range from 93.8% to 40.6% depending on how the question is asked. Depending on how the question is worded, inaccurate information may be obtained, which could lead to an inaccurate diagnosis.

Certainly, there were several decisions that needed to be made concerning the analysis of the data. Our decision to use the psychiatric group as a comparison was made for two reasons: it is important to attempt to differentiate the symptoms of CFS from those with fatigue due to a psychiatric explanation, and the prior study comparing the ME definition to CFS had also used a psychiatric group as a control group, and by keeping the contrast groups similar, it was possible to compare the results of the present study with that of Jason et al. (18).

Some readers might feel that it was a mistake to include only 12 of the original 32 Fukuda et al. (7) cases in the CFS group. In contrast, we could have compared the 32 individuals with the Fukuda et al. (7) crite-

ria with the 23 meeting the Canadian case definition and the 33 with CF-psychiatric, and then presented the symptom profiles for these three groups. Unfortunately, such a scheme would have produced groups that were not independent, and it would have been difficult to justify statistical approaches with some cases included within more than one group. It is worth mentioning that it is quite likely that the Fukuda et al. (7) CFS group as originally constituted would have been quite different from the CF-psychiatric group. Within the Fukuda et al. (7) CFS criteria, there are probably those individuals who are more debilitated, and those who are less so, and those in the former group are more likely to meet the Canadian case definition.

There were several methodological limitations in this study. Findings from this study are preliminary and should be interpreted within the context of limitations on statistical power imposed by a small sample size, particularly with regard to the smaller CFS group. Because some differences between groups may not have been detected, more research with larger samples is necessary to replicate these findings. In addition, most measures are of self-reports (such as with the symptom questionnaire), and in future studies, there is a need to examine biological markers that might also differentiate these groups.

In summary, those individuals in this study meeting the Canadian criteria appear to have more symptoms, more physical functional impairment, and less psychopathology than those in the CF-psychiatric group. In addition, the Canadian criteria identifies patients with more fatigue/weakness, neurological and neuropsychiatric symptoms than the Fukuda CFS criteria does.

NOTES

1. Only 65.2% of the participants who were diagnosed with the Canadian case definition endorsed the item postexertional malaise, which needed to occur for 24 hours after exercise. In examining these patients, the examining physician and other data within their records clearly indicated that they had postexertional malaise. In addition, in the Canadian criteria, it is indicated that the fatigue comes in many "flavours." This Canadian case definition makes that point that lack of stamina and fatigue need to be considered when assessing this dimension.

2. Only 78.3% of the participants in the Canadian criteria group indicated that they had memory and concentration problems. However, to meet the criteria for Clinical Neurocognitive difficulties, there are many symptoms that can fulfill this criteria in addition to memory and concentration problems.

REFERENCES

1. Friedberg F, Jason LA. Understanding chronic fatigue syndrome: A guide to assessment and treatment. 1998 Washington DC: Amer Psych Assoc.

2. Jason LA, Wagner L, Taylor R et al. Chronic fatigue syndrome: A new challenge for health care professionals. *J Com Psych* 1995; 23: 143-164.

3. Holmes GP. Defining chronic fatigue syndrome. *Rev Infec Dis* 1991; 13: S53-55.

4. Holmes GP, Kaplan JE, Gantz NM et al. Chronic fatigue syndrome: A working case definition. *Ann Int Med* 1988; 108: 387-389.

5. Katon WJ, Buchwald DS, Simon GE et al. Psychiatric illness in patients with chronic fatigue syndrome and rheumatoid arthritis. *J Gen Int Med* 1991; 6: 277-285.

6. Katon W, Russo J. Chronic fatigue syndrome criteria. A critique of the requirement for multiple physical complaints. *Arch Int Med* 1992; 152: 1604-1609.

7. Fukuda K, Straus SE, Hickie I et al. The chronic fatigue syndrome: A comprehensive approach to its definition and study. *Ann Int Med* 1994; 121: 953-959.

8. Tiersky LA, Weisberg S, Zhang QW et al. Symptom frequency and severity in chronic fatigue syndrome. 2000. Unpublished manuscript.

9. Jason LA, Torres-Harding SR, Taylor RR et al. A comparison of the 1988 and 1994 diagnostic criteria for chronic fatigue syndrome. *J Clin Psych Med Setting* 2001; 8: 337-343.

10. Hyde BM, Goldstein JA, Levine P. The clinical and scientific basis of Myalgic Encephalomyelitis/Chronic Fatigue Syndrome. 1992 Nightingale Research Foundation. Ottawa, Ontario, Canada.

11. Ramsay MA. Myalgic Encephalomyelitis: A baffling syndrome with a tragic aftermath. 1981; The ME Association.

12. Ramsay MA. Myalgic encephalomyelitis and postviral fatigue states: The saga of Royal Free Disease. Sec Ed. 1988; Gower Pub Co.

13. Dowsett EG, Ramsay AM, McCartney RA et al. Myalgic Encephalomyelitis–A persistent enteroviral infection? *Postgrad Med J* 1990; 66: 526-530.

14. Lloyd AR, Hickie I, Boughton CR et al. Prevalence of chronic fatigue syndrome in an Australian population. *Med J Aust* 1990; 153: 522-528.

15. Jason LA, Taylor RR, Kennedy CL et al. A factor analysis of chronic fatigue symptoms in a community-based sample. *Soc Psych Psych Epi* 2002; 37: 183-189.

16. Jason LA, Taylor RR. Applying cluster analysis to define a typology of chronic fatigue syndrome in a medically evaluated, random community sample. *Psych Health* 2002; 17: 323-337.

17. Linder R, Dinser R, Wagner M et al. Generation of classification criteria for chronic fatigue syndrome using an artificial neural network and traditional criteria set. *In vivo* 2002; 16: 37-44.

18. Jason LA, Helgerson J, Torres-Harding SR et al. Variability in diagnostic criteria for chronic fatigue syndrome may result in substantial differences in patterns of symptoms and disability. *Eval Health Prof* 2003; 26: 3-22.

19. Jason LA, Richman JA, Rademaker AW et al. A community-based study of chronic fatigue syndrome. *Arch Int Med* 1999; 159: 2129-2137.

20. Carruthers BM, Jain AK, De Meirleir KL et al. Myalgic encephalomyelitis/ chronic fatigue syndrome: Clinical working case definition, diagnostic and treatment protocols. *J Chron Fatigue Synd* 2003; 11(1): 7-115.

21. Spitzer RL, Williams JBW, Gibbon M et al. Structured Clinical Interview for DSM-IV–Non-Patient Edition (SCID-NP, Version 2.0). 1995 Washington DC: American Psyc Press.

22. Komaroff AL, Fagioli LR, Geiger AM et al. An examination of the working case definition of chronic fatigue syndrome. *Amer J Med* 1996; 100: 56-64.

23. Ware JE, Sherbourne CD. The MOS 36-item Short-Form Health Survey: Conceptual framework and item selection. *Med Care* 1992; 30: 473-483.

24. Ware JE, Snow KK, Kosinski M et al. SF-36 Health Survey: Manual and Interpretation Guide. 2000 Lincoln, RI: Quality Metric Incorporated.

25. McHorney CA, Ware JE, Raczek AE. The MOS 36-item Short-Form Health Survey (SF-36): II. Psychometric and clinical tests of validity in measuring physical and mental health constructs. *Med Care* 1993; 31: 247-263.

26. McHorney CA, Ware JE, Rogers W et al. The validity and relative precision of MOS short- and long-form health status scales and Dartmouth COOP charts. Results from the Medical Outcomes Study. *Med Care* 1992; 30 (Suppl.): MS 253-265.

27. McHorney CA, Ware JE, Lu RL, Sherbourne D. The MOS 36-item Short-Form Health Survey (SF-36): III. Tests of data quality, scaling assumptions, and reliability across diverse patient groups. *Med Care* 1994; 32(1): 40-66.

28. Ware JE, Kosinski M, Keller S D. SF-36 Physical and Mental Health Summary Scales: A User's Manual. 1994; Boston, MA: Health Assessment Lab, New Engl Med Center.

29. Brazier JE, Harper R, Jones NMB et al. Validating the SF-36 Health Survey Questionnaire. *Qual Life Res* 1992; 2: 169-180.

30. Chalder T, Berelowitz G, Pawlikowska T et al. Development of a fatigue scale. *J Psycho Med* 1993; 37: 147-153.

31. Rowe PC, Calkins H. Neurally mediated hypotension and chronic fatigue syndrome. *Amer J Med* 1998; 105: 15S-21S.

32. Streeten DHP, Thomas D, Bell DS. The roles of orthostatic intolerance, orthostatic tachycardia, and subnormal erythrocyte volume in the pathogenesis of chronic fatigue syndrome. *Amer J Med Sci.* 2000; 320: 1-8.

33. Wilke WS, Fouad-Tarazi FM, Cash JM et al. The connections between chronic fatigue syndrome and neurally mediated hypotension. *Clevel Clinic J* 1998; 65: 261-266.

34. Jason LA, Torres-Harding SR, Carrico AW et al. Symptom occurrence in persons with chronic fatigue syndrome. *Bio Psychol* 2002; 59: 15-27.

35. Hartz AJ, Kuhn E M, Levine PH et al. Characteristics of fatigued persons associated with features of chronic fatigue syndrome. *J Chron Fatigue Synd* 1998; 4(3): 71- 97.

36. Bates DW, Buchwald D, Lee J et al. A comparison of case definitions of chronic fatigue syndrome [Abstract]. *Clin Res* 1992; 40: 234A.

37. Jason LA, King CP, Richman JA et al. US case definition of chronic fatigue syndrome: Diagnostic and theoretical issues. *J Chronic Fatigue Synd* 1999; 5(3/4): 3-33.

RECEIVED: 06/07/03
REVIEWED: 08/12/03
ACCEPTED: 09/25/03