Acute-Phase Fatigue Predicts Limitations with Activities of Daily Living 18 Months after First-Ever Stroke

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Background: Fatigue during the acute phase following stroke has been shown to predict long-term physical health, specifically increased bodily pain and poorer self-rated general health. The aim of this analysis was to determine whether acute-phase fatigue also predicts patients' limitations in activities of daily living (ADL) 18 months after the first stroke. *Methods:* Patients with first-ever stroke (N = 88) were recruited upon admission at 2 hospitals in Norway. Patients were assessed within 2 weeks following admission and at 18 months using the Barthel Index of Activities of Daily Living (BI), Fatigue Severity Scale, and Beck Depression Inventory II. The relationship between acute-phase fatigue and later activity limitations (BI < 20) was evaluated using multivariate logistic regression analysis controlling for relevant covariates and acute-phase ADL function. *Results:* Acute-phase fatigue was associated with activity limitations at 18-month follow-up ($P = .002$), even when controlling for other predictors of ADL function, including age, gender, baseline work status, and acute-phase depressive symptoms and ADL function. Examining the reverse relationship, acute-phase activity limitations were unrelated to fatigue 18 months after stroke. *Conclusion:* Our study indicates that acute-phase fatigue may be an independent risk factor for activity limitations 18 months after stroke. This finding suggests that effective treatments for poststroke fatigue both in the acute phase and later in the recovery period may contribute to better stroke rehabilitation. **Key Words:** Activities of daily living—activity limitation—fatigue—stroke—rehabilitation.

Introduction

Poststroke fatigue occurs in an estimated 36% to 77% of stroke cases[1-3] and is associated with poorer quality of life outcomes.[4-7] In our prior work,[8] we reported that fatigue during the acute phase following stroke predicts physical health-related quality of life 18 months later. In addition to reduced quality of life, stroke patients often experience limitations in their ability to manage activities of daily living (ADL) and minimizing such limitations is a key focus of rehabilitation. A small descriptive study concluded that mental fatigue could be a factor influencing patients' ADL function 1 and 9 months after a transient ischemic attack,[9] and a cross-sectional path analysis study showed that poststroke fatigue predicted disability.[10] Another study found that poststroke depression may play a role in activity limitations, as patients with both poststroke fatigue and depression were found to have greater activity limitations than patients who had poststroke fatigue without depression.[11] However, 2 recent studies report significant relationships between poststroke fatigue and activity limitations in patients with either transient ischemic attack[12] or stroke,[13] even when controlling for poststoke depression. These prior studies suggest that

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poststroke fatigue may play a role in activity limitations, but to our knowledge, no longitudinal studies have examined whether fatigue in the acute phase following stroke predicts patients' longer-term functional limitations.

Since fatigue may interfere with patients' participation in rehabilitation after stroke, it is of clinical importance to understand to what degree fatigue predicts subsequent outcomes related to ADL function. Furthermore, the acute phase following stroke may represent a critical period for maximizing recovery, as evidenced by findings related to early mobilization.[14,15] It is therefore important to understand whether fatigue, particularly during this period, is a risk factor for poorer ADL function. Thus, the aim of this study was to determine whether poststroke fatigue in the acute phase predicts longer-term activity limitations. It was hypothesized that acute-phase fatigue would predict activity limitations 18 months after stroke, even when controlling for potentially confounding variables.

Methods

Sample and Procedures

The Post-Stroke Fatigue Study is a longitudinal, observational study conducted at 2 hospitals in Norway between March 2007 and September 2008.[16] The study was approved by the Regional Medical Research Ethics Committee of Health East of Norway (#2.2007.90), the Norwegian Data Inspectorate, and the hospital approval units for security of personal data.

Patients with first-ever stroke were recruited for the study upon hospital admission. Informed written consent was obtained from all study participants. Study inclusion criteria were the following: first-ever clinical presentation of stroke (either ischemic or hemorrhagic) according to the International Classification of Diseases (ICD)-10 (I60-64),[17] ≥18 years of age, and sufficient cognitive functioning to participate. Patients who were fully conscious, or somnolent but could be awakened to full consciousness (equivalent to a score of 4 or 6 on item #1 in the Scandinavian Stroke Scale [SSS])[18] and oriented to time, place, and person (equivalent to a score of 4 on SSS item #6) were eligible. At 1 hospital, those who did not meet the SSS criterion were further assessed with Mini-Mental State Examination (MMSE), and those with MMSE score ≤10 or MMSE score 11-23 but found cognitively incompetent by a physician or nurse were excluded. At the second hospital, patients who did not meet the SSS criteria were clinically assessed by the stroke team, and those found to be cognitively impaired were excluded. Patients at both hospitals were excluded if they were unable to communicate (participate in a meaningful conversation or point to responses on questionnaires).

Data were collected from medical records and in standardized interviews using validated questionnaires. Interviews were conducted at 2 different times within 48 hours to minimize participant burden in the acute phase (i.e., first 2 weeks after admission). Data on ADL function and fatigue were collected during the first interview. Follow-up data were collected 6, 12, and 18 months later.[19] Most follow-up interviews were conducted in the patient's home, although for those working or traveling, the questionnaires were sent by mail and returned in a sealed envelope. Data collected in the acute phase and at 18-month follow-up were included in this report.

Measurements

ADL

ADL function was assessed using the 10-item Barthel Index of Activities of Daily Living (BI).[20] Total scores can range from 0 (completely dependent) to 20 (completely independent).[21] Activity limitations were defined as a BI score less than 20, an approach that has been used in prior research.[9]

Fatigue

The Fatigue Severity Scale (FSS)[22] was used to assess fatigue because it is the most commonly used instrument to measure fatigue in stroke research[23] and has good validity and reliability.[24] The FSS also only has 9 items, and a brief scale was particularly needed for assessing fatigue during the acute phase following stroke. The modified FSS-7 was previously shown to have stronger psychometric properties among stroke patients[24] and was therefore used in this study. Patients rate their level of agreement with 7 statements about fatigue interference on a 7-point Likert scale ranging from strongly disagree to strongly agree. An FSS mean score ranging from 1 to 7 was computed for each patient, with higher scores indicating higher levels of fatigue. Scores of 4 or higher were considered indicative of moderate to severe fatigue. Pre-stroke fatigue was assessed retrospectively by asking patients during the acute phase whether they had experienced fatigue in the 3 months prior to their stroke.

Depressive Symptoms

The Beck Depression Inventory Version II[25] was included in this analysis so that the role of fatigue could be examined while controlling for its known association with depression. The Beck Depression Inventory Version II has been found to be an acceptable screening instrument for depression in stroke patients.[26]

Sociodemographic Variables

Data on age, gender, and cohabitation status (living with spouse/partner or not) were collected from the medical record, whereas data on formal education (less than 12 years versus 12 years or more) were collected from a ques-