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Epidemiology of Restricting Fatigue in Older Adults: The Precipitating Events Project

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Abstract

OBJECTIVES—To estimate the rate of restricting fatigue among community-living older adults and to determine whether the rates differ according to age, sex, race, physical frailty and depression.

DESIGN—Prospective cohort study.

SETTING—Greater New Haven, Connecticut.

PARTICIPANTS—754 nondisabled community-living older men and women aged 70.

MEASUREMENTS—Restricting fatigue was defined as staying in bed for at least ½ the day and/or cutting down on one's usual activities because of fatigue for 3 consecutive months. Physical frailty was defined on the basis of slow gait speed, and depression was assessed using the CES-D.

RESULTS—During a median follow-up of 111 months, the cumulative incidence of restricting fatigue was 31.1% for men and 42.1% for women. The overall incidence rate of restricting fatigue was 6.7 per 1000 person-months - 7.8 for women and 4.4 for men ($p < .001$), but did not differ by race. Rates were higher in persons who were physically frail than those who were not frail ($p < .001$), in those who were depressed than those who were not depressed ($p < .001$), and in persons aged 75–79 and 80–84, respectively, than those 70–74 (both $p < .01$), but not in those aged 85.

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Conflict of Interest:

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Of the 459 episodes of restricting fatigue, the median duration was 3 months and did not differ according to age, sex, race, physical frailty or depression.

CONCLUSION—Restricting fatigue is common among community-living older adults. Women, those aged 75–84, and those with physical frailty or depression had higher rates of restricting fatigue than their respective counterparts.

Keywords

aging; fatigue; epidemiology; restricted activity; cohort study

INTRODUCTION

Fatigue is commonly reported in the general population, with a prevalence in adults ranging from 5% to almost 50% (1). The association between age and fatigue has been inconsistent, with some studies finding an increase of fatigue with age (2, 3), while others showing no difference (4, 5) or decreased fatigue with advancing age (6). Data from the 2004 wave of the Health and Retirement Study, a U.S. nationally representative sample of community-dwelling adults aged 51 or older, showed a prevalence of fatigue of 31.2% (7). For more specific populations, the prevalence varies from 27% for any disabling fatigue lasting a minimum of 3 months in a primary care sample of older adults (8) to 47% for moderate and severe fatigue in ambulatory assisted living residents (9).

The definition of fatigue has differed across studies, with three of the most common being: 1) a persistent feeling of tiredness that interferes with usual daily functioning (10); 2) a sense of decreased energy and increased need to rest (11); and 3) physical and mental weariness resulting from overwhelming sustained exertion (12). Fatigue is the primary reason given by community-living older adults for restricted activity (13) and is also associated with decreased physical function (14–16), future hospitalizations, use of home care services (17), and mortality (18, 19). Relatively little is known, however, about the epidemiology of fatigue over a long period of time, as most studies have been cross-sectional or have had a short duration of follow-up. To enhance clinical relevance, we chose to evaluate fatigue leading to restricted activity, as an indicator of severity. The objectives of the current study were to estimate the cumulative incidence, time to first episode, incidence rates, and duration of restricting fatigue among community-living older adults over an extended period of time and to determine whether the incidence rates differed according to age, sex, race, physical frailty and/or depression. We used data from a unique longitudinal study of community-living older men and women that includes monthly assessments of restricting fatigue for more than 10 years.

METHODS

Study Population

Participants were members of the Precipitating Events Project (PEP Study), a longitudinal study of 754 nondisabled community-living men and women aged 70 years or older. The cohort was selected to be free of disability (no personal assistance required) in four activities of daily living: bathing, dressing, walking inside the house, and transferring from a chair.

Exclusion criteria included: 1) significant cognitive impairment with no available proxy; 2) inability to speak English; 3) diagnosis of a terminal illness with a life expectancy less than 12 months; and 4) plan to move out of the New Haven, Connecticut, area during the following 12 months. Recruitment, which took place between March 1998 and October 1999, has been described in detail elsewhere (13).

Potential participants included age-eligible members of a large health plan in greater New Haven, Connecticut. Of the 2,753 health plan members who were alive and could be contacted, only 4.6% refused to complete the telephone screening interview; and 75.2% agreed to participate in the study. Persons who refused to participate in the study didn't differ significantly in age or sex from those who were enrolled in the study. The study protocol was approved by the Yale Human Investigation Committee, and all participants gave verbal informed consent.

Data Collection

A home-based assessment was performed at baseline and monthly telephone interviews were completed for more than 10 years (through May 2010). Among the 754 participants, 452 (60.1 %) died after a median follow-up of 71 months, and 35 (4.6 %) dropped out of the study after a median follow-up of 25 months. Completion of the monthly telephone interviews has been greater than 99%. Baseline demographic data included age, gender, race/ethnicity, education and living situation. Self-reported, physician diagnosed chronic conditions included: diabetes, hypertension, myocardial infarction, congestive heart failure, stroke, cancer, arthritis, hip fracture and chronic lung disease.

To assess physical frailty, participants were asked to walk back and forth over a 10-foot course as "quickly and safely as possible"; a score of longer than 10 seconds denoted physical frailty (20). Participants' self-reported height and weight were used to calculate the body mass index (BMI). Cognitive status was assessed using the Folstein Mini-Mental State Examination (21), and depressive symptoms were assessed with the 11-item Center for Epidemiologic Studies-Depression Scale (CES-D) (22). Scores were transformed using the procedure recommended by Kohout et al. (23). Total scores range from 0 to 60, with higher scores indicating more depressive symptoms. Participants scoring ≥ 20 were considered as having "clinically significant depressive symptoms" or "depression" (24).

Assessment of Restricting Fatigue

Fatigue leading to restricted activity was assessed during the monthly interviews using a 4-step protocol (13). Each month, participants were asked, "Since we last talked, have you stayed in bed at least half the day due to an illness, injury or other problem?" followed by, "Since we last talked, have you cut down on your usual activities due to an illness, injury, or other problem?". Participants who answered "yes" to either question were considered to have restricted activity during a specific month. These participants were subsequently asked to identify the reason for their restricted activity. One of the prespecified reasons was fatigue. Specifically, participants with restricted activity were asked, "Since we last talked, have you been fatigued (no energy/very tired)?" If they answered "yes", they were then asked "did this problem cause you to stay in bed at least half the day or cut down on your

usual activities?”. Participants who answered “yes” were considered to have “restricting fatigue”, which was the focus of the current analysis. The test–retest reliability of this four-step protocol was high, with a k value of 0.86 for restricting fatigue. To enhance clinical relevance, we defined an episode as restricting fatigue if it was present for 3 or more consecutive months.

Statistical Methods

Baseline demographic and clinical characteristics data are presented using frequencies and proportions for categorical variables and means and standard deviations for continuous variables. The cumulative incidence of restricting fatigue episodes and time (in months) to the first episode of restricting fatigue were estimated using the Kaplan-Meier method, first among the overall population and then according to sex, age, race, physical frailty, and depression at baseline; and statistical significance of the survival curves between subgroups was assessed using the log-rank test. The assumption of proportionality was tested. Participants who didn’t develop any episode of restricting fatigue were censored at the time of their last completed interview, death or end of the follow-up period. The incidence rate of restricting fatigue (number of episodes per 1,000 person-months) and 95% confidence intervals (CI) were estimated using the Poisson regression model with correction for overdispersion and p -values were obtained from type 3 analyses. Analyses were performed using SAS, version 9.3 (SAS Institute, Inc., Cary, NC).

RESULTS

As shown in Table 1, our study population was predominantly female and white, with a mean age of 78 years (± 5.3). On average, participants had a high school education, were not living alone, and had about 2 chronic conditions. The prevalence of physical frailty was 43%. A relatively small minority of participants had cognitive impairment or depression, respectively.

Of the 754 participants, 237 (31.4%) had at least one episode of restricting fatigue and 111 (14.7%) had 2 or more episodes during a median follow-up of 111 months. The number of episodes ranged from 0 to 12 (interquartile range [IQR], 0 – 1). As shown in Figure 1, the cumulative incidence of restricting fatigue was 31.1% for men and 42.1% for women. The time to the first episode of restricting fatigue was significantly shorter in women (median: 75 months) than men (81 months) ($p=0.009$; and $p=.020$ after adjusting for age), in participants with physical frailty (53 months) than those without physical frailty (105 months) ($p<.001$), and in participants with depression (40 months) than those without depression (82 months) ($p<.001$). There was no statistical differences according to age ($p=0.21$) or race ($p=0.91$).

The overall incidence rate (first and recurrent episodes) of restricting fatigue was 6.7 per 1,000 person-months. Among the 459 episodes of restricting fatigue, the median (IQR) duration was 3 months (3–4) and did not differ according to sex, age, race, physical frailty, or presence of depression at baseline. Forty-eight episodes (10.5%) lasted 6 months or longer (maximum: 30 months). As shown in Table 2, the rates of restricting fatigue were significantly higher in women than men ($p<.001$), and in participants aged 75–79 and 80–84, respectively compared with those aged 70–74 (both $p<.01$), but not in those aged 85 or

older. Participants with physical frailty had higher rates than those without physical frailty ($p < .001$), but there was no statistical difference according to race ($p = 0.43$). The rates were also significantly higher in participants with depression than those without depression ($p < .001$).

DISCUSSION

In this prospective study of community-living older adults, we found that fatigue leading to restricted activity is common, of relatively short-term duration and frequently episodic. Women, those aged 75–84 and those with physical frailty or depression had higher rates of restricting fatigue than their respective counterparts. Our study provides new information about the burden of a highly distressing symptom in older persons.

Most of the prior studies evaluating fatigue in community-living older adults have been cross-sectional (7–9, 16). Of the longitudinal studies, none has evaluated fatigue leading to restricted activity, as a clinical indicator of severity. Prior longitudinal studies have used different definitions of fatigue, had longer intervals between assessments and shorter duration of follow-up (25, 26). For example, one study used two interviews 5 years apart (at age 75 and 80), with fatigue defined as tiredness in daily activities and mobility, making comparisons to our study very difficult (25). Another study evaluated changes in a fatigue score, defined on the basis of being exhausted, having no energy and performing below par, over a time period varying from 18 months for centenarians to 5 years for sexagenarians and octogenarians, again making direct comparison with our study difficult (26). Because of the monthly interviews, we were able to more precisely assess the number and duration of episodes of fatigue leading to restricted activity. We found that restricting fatigue had a relatively short duration and was frequently episodic.

Our results indicate that the burden of restricting fatigue is greater in women than men, whether in terms of cumulative incidence, time to first episode or incidence rates per 1000 person months. Comparable findings have also been reported in prior studies (7, 16, 27). Women might be more willing to report fatigue than men. Evaluating the risk factors of restricting fatigue might help to elucidate these sex differences. Rates of restricting fatigue episodes were also higher in persons aged 75 to 84, compared with those aged 70–75 years. These results are in line with previous findings showing lower prevalence of fatigue in the younger age groups (in men aged 60–64 years and women aged 65–69 years) of the Health Retirement Survey (HRS) (7). In contrast to HRS (7), however, the rate of restricting fatigue was not statistically elevated in the oldest age group (85+) in our study, which could be attributable to reduced power given their smaller numbers. Alternatively, the oldest old might reduce their activity level to maintain perceived fatigue levels within an acceptable range. Reduced power might also explain, at least in part, the absence of a statistically significant difference in rates of restricting fatigue by race. Our finding that restricting fatigue was more common among persons with physical frailty than those without physical frailty is consistent with previous research that has reported slower gait speed among older adults with fatigue (16, 28).

“Physical frailty”, defined on the basis of slow gait speed, is distinct from the broader term “frailty”, which is a multidimensional concept. Our definition of physical frailty has high face validity, ease of objective measurement in both research and clinical settings, and a strong epidemiologic link to key outcomes such as functional decline (29). Not surprisingly, participants with depression had higher rates of restricting fatigue than their non depressed counterparts. Other studies have found that depression is an independent predictor of fatigue in both older men and women (30).

Important strengths of this study include the long duration of follow-up, monthly assessments, and an operational definition of fatigue that was linked to restricted activity, thereby enhancing its clinical utility. Nonetheless, we acknowledge that the rates of restricting fatigue might be lower with a more stringent definition of restricted activity, i.e. require staying in bed for a full day instead of ½ a day. Participants were not asked about the number of days that they had restricted their activities in the prior month. Since this value could be as low as 1, we felt that requiring 3 or more consecutive months of restricting fatigue would be more clinically relevant than requiring only 1 month. Because our study participants were members of a single health plan in a small urban area, our findings might not be generalizable to older persons in other settings.

Our results suggest the need for additional research to identify potential modifiable risk factors associated with restricting fatigue in older adults. Further elucidating the epidemiology of restricting fatigue could help to prevent the occurrence or recurrence of this frequent health condition in the older population.

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Figure 1.

Kaplan-Meier curves for time to first episode of restricting fatigue according to sex (Panel A) ($P < 0.01$), age (B) ($P = 0.21$), race (C) ($P = 0.91$), physical frailty (D) ($P < 0.001$) and depression at baseline (E) ($P < 0.001$).

P-values were derived from the log-rank test.

Assumption of proportionality was satisfied for each of the five Kaplan-Meier analyses.

Table 1

Baseline Characteristics of the Study Population (N= 754)

Characteristic	Value
Age, mean $\pm$ SD	78.4 $\pm$ 5.3
Age, n (%)	
70–74	213 (28)
75–79	238 (32)
80–84	201 (27)
85	102 (14)
Female, n (%)	487 (65)
Non-Hispanic white, n (%)	682 (91)
Education, years, mean $\pm$ SD	12 $\pm$ 2.9
Living alone, n (%)	298 (40)
Number of chronic conditions, mean $\pm$ SD	1.8 $\pm$ 1.2
BMI (Kg/m ²), n (%)	
< 18	15 (2)
18 – < 25	289 (38)
25 – < 30	285 (38)
30	165 (22)
Physically frail, n (%) *	322 (43)
Mini-Mental State Examination score < 24, n (%)	86 (11.4)
Depression, n (%) ¶	100 (13.3)

* Defined as a timed score of longer than 10 seconds on the rapid gait test, as described in the methods section

¶ Defined as a Center for Epidemiological Studies Depression Scale score (CES-D) $\geq$ 20

Table 2

Incidence Rates of Episodes of Restricting Fatigue According to Sex, Age, Race, Physical Frailty and Depression

Baseline Characteristic	No. of Person-Months Followed,	No. of Episodes Observed	Rate per 1,000 Person-Months (95% Confidence Interval)*
Overall	68846	459	6.7 (5.9–7.5)
Sex			
Male	22720	101	4.4 (3.5–5.7)
Female	46126	358	7.8 (6.8–8.9)
Age at baseline			
70 – 74	21756	105	4.8 (3.8–6.2)
75 – 79	22585	170	7.5 (6.2–9.1)
80 – 84	17780	142	8.0 (6.5–9.9)
85	6725	42	6.2 (4.2–9.2)
Race			
Non-Hispanic white	61749	405	6.6 (5.8–7.4)
Other	7097	54	7.6 (5.4–10.8)
Physical frailty			
No	43159	206	4.8 (4.0–5.7)
Yes	25687	253	9.8 (8.4–11.5)
Depression			
No	60547	358	5.9 (5.2–6.8)
Yes	8299	101	12.2 (9.5–15.6)

* Estimated using a Poisson regression model with adjustment for potential overdispersion