Published in final edited form as:

J Am Geriatr Soc. 2011 April ; 59(4): 610–614. doi:10.1111/j.1532-5415.2011.03329.x.

Epidemiology of Restricting Back Pain in Community-Living Older Persons

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Abstract

Objectives—To estimate the incidence of back pain leading to restricted activity (restricting back pain) in community-living older persons and to characterize its descriptive epidemiology.

Design—Prospective cohort study.

Setting—Greater New Haven, Connecticut.

Participants—550 nondisabled, community-living men and women, aged 70+ years, who did not report restricting back pain at baseline.

Measurements—Participants were interviewed monthly for more than 10 years to ascertain the cumulative incidence, time to first episode, incidence rates (including first and repeat episodes), and duration of restricting back pain. Cumulative incidence (proportions) were estimated using the Kaplan-Meier method and incidence rates (per 1000 person-months) were estimated using a Poisson regression model.

Results—During the 10+ years of follow-up (median: 107 months), the cumulative incidence of restricting back pain was 77.3% for men and 81.7% for women. The median time to the first episode was significantly shorter in women (25 months) than men (49 months) ($p = 0.01$). The incidence rates of restricting back pain per 1000 person-months were 32.9 overall, 24.4 for men, and 37.5 for women ($p < 0.001$). There were no differences by baseline age group. Of the 1528 total episodes of restricting back pain, the median duration was 1.0 month, and only 6.4% lasted for $\geq$ three consecutive months.

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These data were presented at the following meetings:

American College of Rheumatology National Meeting, Philadelphia, PA, October 19, 2009 American Geriatrics Society Annual Meeting, Chicago, IL, May 1, 2009 NIA Technical Assistance Workshop, National Harbor, MD, November 20, 2008

Conflict of Interest: The editor in chief has reviewed the conflict of interest checklist provided by the authors and has determined that the authors have no financial or any other kind of personal conflicts with this paper.

Author Contributions:

Una E. Makris: study concept and design, data analysis, interpretation of data, preparation of manuscript

Liana Fraenkel: study concept and design, interpretation of data, preparation of manuscript

Ling Han: data analysis, interpretation of data, preparation of manuscript

Linda Leo-Summers: data analysis, interpretation of data, preparation of manuscript

Thomas M. Gill: study concept and design, interpretation of data, preparation of manuscript

Sponsor's Role: The sponsor did not have a role in the design, methods, subject recruitment, data collections, analysis and preparation of paper.

Conclusion—Restricting back pain among older persons is common, short-lived, and frequently episodic. The burden of restricting back pain is greater among older women than older men.

Keywords

Aged; Back Pain; Epidemiology; Cohort Studies

INTRODUCTION

In the United States, back pain is the most common type of pain reported by adults; 26.4% report back pain lasting for at least one day in the past three months and 2.3% of all office-based physician visits are related to low back pain (1). Back pain is also costly: in 2005 dollars, the total health care expenditures exceeded \$100 billion (2). Back pain is the second most common cause of disability in adults, affecting 16.8% (7.6 million) of the population (3) and the most common cause of work-related disability in persons under the age of 45 (4).

While the epidemiology of back pain in younger persons has been well described, considerably less is known about back pain in older persons. Prevalence estimates range from 5.9% to 72.6% (5–17) depending on the population studied and the definition of back pain used (7). A recent study reported a rising trend over time in the prevalence of chronic (more than three months) (8, 18) back pain in persons 65 years or older, with rates increasing from 5.9% in 1992 to 12.3% in 2006 (8). A nationwide survey of Danish centenarians found that back pain is common and bothersome even in extreme old age, with 17% of men and 29% of women reporting back pain during the preceding month (9). Both cross-sectional and longitudinal data show that back pain is more common in women than men (1, 5–9, 11–15). It is not clear from the literature if back pain increases or decreases with age (19). Despite the high prevalence, cost and morbidity attributable to back pain, longitudinal data describing its epidemiology in older persons are limited.

The objectives of this study were to estimate the cumulative incidence, time to first episode, incidence rates (including first and repeat episodes), and duration of restricting back pain over an extended period of time, and to determine whether these results differ according to sex and age. To enhance the clinical relevance of the study, we focused on back pain leading to restricted activity, hereafter referred to as restricting back pain. To accomplish our objectives, we used data from a unique longitudinal study that includes monthly assessments of restricting back pain for more than 10 years in a large cohort of older community-living men and women. By elucidating the epidemiology of restricting back pain, the current study will allow clinicians to better communicate prognostic information to their patients.

METHODS

Study Population

Participants were members of the Precipitating Events Project (PEP), a longitudinal study of 754 non-disabled community-living persons, aged 70 years or older (20). Exclusion criteria included the need for personal assistance in one or more of four essential activities of daily living (ADLs): bathing, dressing, walking inside the house, and transferring from a chair; significant cognitive impairment with no available proxy; inability to speak English; diagnosis of a terminal illness with a life expectancy less than 12 months; and plans to move out of the New Haven area during the following 12 months.

The assembly of the PEP cohort, which took place between March 1998 and October 1999, has been described in detail elsewhere (20). Potential participants included age-eligible members of a large health plan in greater New Haven, Connecticut. Only 4.6% of the 2753

health plan members who were alive and could be contacted refused to complete the screening telephone interview; and 75.2% agreed to participate in the study. Those who refused to participate did not differ significantly by sex or age from those who enrolled in the study (20). The Yale Human Investigation Committee approved the study protocol.

Data Collection

A comprehensive home-based assessment was completed at baseline and telephone interviews were completed monthly for more than 10 years (i.e. through November, 2008). Of the 754 participants, 372 (49.3%) died after a median follow-up of 65 months, and 34 (4.5%) dropped out of the study after a median follow-up of 23.5 months.

During the baseline assessment, demographic data were collected on sex, age, race/ethnicity, education, living situation and relevant clinical characteristics. Medical comorbidities included nine self-reported, physician-diagnosed chronic conditions: arthritis, hip fracture, diabetes mellitus, hypertension, myocardial infarction, congestive heart failure, stroke, cancer, and chronic lung disease. Body mass index (BMI) was calculated using participants' self-reported height and weight; a BMI of 30 kg/m² or higher was used to define obesity (World Health Organization definition). Physical frailty was determined by a timed score of longer than 10 seconds on the rapid gait test (walk back and forth over a 10-foot course as quickly as possible) (21, 22). Cognitive status was assessed using the Folstein Mini-Mental State Examination (23). Depressive symptoms were assessed by the Center for Epidemiologic Studies Depression (CES-D) scale; participants who scored 16 or higher on the CES-D scale were classified as having depressive symptoms (24).

Assessment of Restricting Back Pain

Back pain leading to restricted activity was assessed during the monthly interviews. 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?" and, "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 and were subsequently asked whether their restricted activity was due to back pain. An episode of restricting back pain had to be preceded and followed by a month with no restricting back pain except in the case of death and at the end of the follow-up period. Episode duration was defined as the number of consecutive month(s) of restricting back pain; and an episode lasting for three or more consecutive months was considered as chronic (8, 18). The completion rates for the monthly assessments exceeded 99%; and the reliability of the assessment for restricting back pain was high, with kappa = 0.84 (17).

Statistical Analysis

The study sample included 550 participants who did not report restricted activity at baseline. The demographic and clinical characteristics at baseline were summarized using mean and standard deviation for continuous variables, and frequencies and proportions for categorical variables. Cumulative incidence (proportions) were estimated using the Kaplan-Meier method. The time (in months) to the first episode of restricting back pain, according to sex and baseline age group (70–74, 75–79, 80–84, and 85+ years), was estimated using the Kaplan-Meier method, and differences were evaluated with the log-rank test. Participants who did not develop restricting back pain during the follow-up period were censored at the month of drop-out from the study, death or reaching the end of follow-up alive.

Next, the overall and sex- and age- specific incidence rates of restricting back pain (reported as number of restricting back pain episodes per 1000 person-months), and their 95% confidence intervals (CI), were estimated using a Poisson model (25) with adjustment for

over dispersion. The duration of restricting back pain (in months), was summarized according to sex and age group, using medians and interquartile ranges (IQR), and the differences were evaluated using non-parametric Wilcoxon on rank sum tests.

All statistical tests were two-tailed, and $p < 0.05$ was considered to indicate statistical significance. All analyses were performed using SAS version 9.1 (SAS Institute, Inc., Cary, NC).

RESULTS

Table 1 provides baseline characteristics of the study sample. The majority of participants were women, white, and lived alone. On average, participants were nearly 80 years old, had a high school education, and had approximately two chronic conditions, with the most common being hypertension (55%) and arthritis (28%). A minority of participants were obese or physically frail. Overall, the participants were cognitively intact, and a minority reported depressive symptoms.

The cumulative incidence of restricting back pain was 77.3% for men and 81.7% for women. The times to first episode of restricting back pain according to sex (Panel A) and age group (Panel B) are shown in Figure 1. The median time to the development of restricting back pain was significantly shorter in women (25 months) than men (49 months) ($p = 0.01$), but there was no statistical difference according to age group ($p = 0.57$).

Table 2 provides the incidence rates (including first and repeat episodes) of restricting back pain. The overall rate was 32.9 per 1000 person months. The rate was significantly higher in women than men ($p < 0.001$), but did not differ statistically according to age group ($p = 0.33$). Of the 1528 episodes of restricting back pain, 1223 (80%) had a duration of one month, and only 98 (6.4%) were chronic. There were no statistical differences in the duration of restricting back pain episodes by sex ($p = 0.72$) or age ($p = 0.16$).

DISCUSSION

In this prospective cohort study of older persons, we found that restricting back pain was common, short-lived, and frequently episodic. Our results also demonstrated that restricting back pain was more common in women than men, but did not differ significantly according to age. These results will help clinicians counsel older patients about the expected course of restricting back pain and reassure them that restricted activity due to back pain is usually self-limited. The episodic nature of restricting back pain suggests that we may be able to prevent or reduce the risk of recurrence if modifiable risks factors and/or precipitants can be identified.

Two other studies have used longitudinal data to evaluate back pain in older persons (10, 11). As compared with our study, both studies used different definitions of back pain and had longer assessment intervals and shorter duration of follow-up. For example, Jacobs and colleagues (11) used two interviews seven years apart (at age 70 and 77) and reported incident *chronic* back pain (defined as “reporting pain on a frequent basis”), thus precluding direct comparisons with our results. Hartvigsen and colleagues (10), utilizing data collected at two time points two years apart from the population-based Longitudinal Study of Aging Danish Twins (aged 70–100 years), evaluated incident “low back pain (pain, stiffness, or other discomfort) during the past year” and whether participants “had altered or diminished their physical activities during the past year due to low back pain.” Seven percent of the Danish cohort had altered or reduced physical activities due to low back pain. In contrast, we report a significantly higher proportion of participants with restricting back pain (77.3% for men and 81.7% for women). The higher proportion in the current study is likely due to

the much greater frequency of assessments (monthly interviews), which reduces the possibility of inaccurate recall, and the longer duration of follow-up (over 10 years).

Our results demonstrate that restricting back pain in older persons is frequently episodic and that very few of the episodes are chronic (lasting more than three months). Based on clinical experience, it is possible that some older persons suffer from chronic back pain that is punctuated by exacerbations, which we captured as restricting back pain. Because our case definition required that the back pain reach a threshold of severity resulting in restricted activity, chronic back pain was likely underestimated. Additional research is needed to determine the risk factors, precipitants, and impact of episodic restricting back pain, and to evaluate why some episodes are chronic rather than short-lived.

Whether assessed as cumulative incidence, time to first episode, or incidence rates per 1000 person-months, the burden of restricting back pain was greater in women than men. This finding is consistent with studies reporting a higher prevalence of musculoskeletal pain, in general, in older women (26). Women, as compared with men, are more willing and likely to report pain (27). Sex differences in the perception, tolerance, expression, and reporting of pain, have been attributed to biological, psychological, and sociocultural factors (28). Specifically, older women may be more likely to report back pain because of reduced muscle mass and higher prevalence of osteoporosis, generalized osteoarthritis, and depressive symptoms as compared with men. Of particular significance, research shows that women report greater pain-related disability than men even after controlling for depression, anxiety and other psychological factors (29). Further research is needed to identify sex-specific risk factors and precipitants of restricting back pain so that effective prevention and therapeutic strategies can be developed.

We found statistically significant differences in the incidence of restricting back pain according to sex, but not according to age. Evidence for an association of back pain with increasing age is sparse and limited by heterogeneity in definitions and methods used (19). Our longitudinal results, which are consistent with those from earlier cross-sectional studies (5, 14), indicate that age is not likely a risk factor for restricting back pain.

This is the first study to report the epidemiology of restricting back pain in a large community-based sample of older persons over such an extended period of time. By utilizing a longitudinal design with monthly assessments, we were able to capture the episodic nature of restricting back pain in older persons. Another strength of this study is the high completion rate of the monthly assessments. Frequent assessments minimize the recall inaccuracies that may be seen in longitudinal studies where participants are asked if they experienced back pain over longer periods of time (30). Our operational definition for restricting back pain is clinically meaningful because it sets a threshold for severity based on the requirement for restricted activity, which has high face validity as a measure of health and functional status (20) and is predictive of subsequent disability and functional decline (31).

There are several limitations of this study. First, data on restricting back pain were not available at baseline. Hence, to ensure that we were evaluating the first episode of restricting back pain, we limited our study sample to participants without restricted activity at baseline. Because the restricted activity could have been due to reasons other than back pain, some participants without restricting back pain were likely omitted from our study sample.

Second, data were not available on the anatomic location or etiology of restricting back pain. We were also unable to determine the specific number of days of each episode of restricting back pain. Despite these limitations, our definition of restricting back pain, by necessitating activity restriction, increases the likelihood that the symptoms we evaluated are clinically

meaningful and not manifestations of mild back discomfort (32). Third, we could not account for the effect of treatment for restricting back pain since this information was not ascertained. Lastly, although this is a community-based study, generalizability is limited since the participants in this cohort were members of a single health plan located in New Haven, Connecticut, which has a larger proportion of non-Hispanic whites than the United States (91% vs. 84%).

Clinical guidelines in the general population (33) specifically recommend that evidence-based information on the expected clinical course of back pain should be provided to affected individuals. By demonstrating that restricting back pain in older persons is episodic, the current study provides new information on the epidemiology of this disorder. This information will be useful in reassuring and counseling older patients about the often short-lived nature of restricting back pain and, hopefully, may lead to minimizing over-prescription of potentially unnecessary or harmful long-term therapies. In addition to providing valuable prognostic information, our results highlight the need for future research to determine which factors cause older patients to perceive back pain as being “restricting”, and to identify modifiable sex-specific risk factors and precipitants, with the ultimate goal of preventing the onset and/or recurrence of this common disorder in older persons.

Acknowledgments

We thank Heather G. Allore, Ph.D., Director of the Biostatistics Core at the Yale Program on Aging, for her expertise and guidance, as well as Leo M. Cooney, Jr., M.D. for his clinical insight and for helping to shape this research in its early stages. We also thank Denise Shepard, B.S.N., M.B.A., Andrea Benjamin, B.S.N., Paula Clark, R.N., Martha Oravetz, R.N., Shirley Hannan, R.N., Barbara Foster, Alice Van Wie, B.S.W., Patricia Fugal, B.S., Amy Shelton, M.P.H., and Alice Kossack for assistance with data collection; Wanda Carr and Geraldine Hawthorne, B.S., for assistance with data entry and management; Peter Charpentier, M.P.H., for development of the participant tracking system; and Joanne McGloin, M. Div., M.B.A., for leadership and advice as the project director.

The work for this report was funded by grants from the National Institute on Aging (R37AG17560, R01AG022993). The study was conducted at the Yale Claude D. Pepper Older Americans Independence Center (P30AG21342). Dr. Makris is currently supported by the National Institute on Aging T32 AG19134 Training Program in Geriatric Clinical Epidemiology and Aging Related Research.

Dr. Fraenkel received support for this work from NIAMS K23 AR048826.

Dr. Gill is the recipient of a Midcareer Investigator Award in Patient-Oriented Research (K24AG021507) from the National Institute on Aging.

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Figure 1. Kaplan-Meier curve for time to first episode of restricting back pain by sex (Panel A, $p = 0.01$) and baseline age group (Panel B, $p = 0.57$).

Table 1Baseline characteristics of the study sample

Characteristic	N = 550
Age in years, mean (SD)	78.6 (5.3)
70–74, n (%)	147 (27)
75–79	172 (31)
80–84	154 (28)
85+	77 (14)
Female, n (%)	346 (63)
Non-Hispanic White, n (%)	505 (92)
Education in years, mean (SD)	12 (2.9)
Live Alone, n (%)	338 (61)
Number of Chronic Conditions, mean (SD)	1.7 (1.2)
Body Mass Index ≥ 30 kg/m ² , n (%)	106 (19)
Physically Frail, n (%) [*]	220 (40)
Mini-Mental State Examination Score, mean (SD) (range 0–30)	26.8 (2.5)
Depressive Symptoms, n (%) [†]	85 (15)

^{*} Operationalized as a timed score of longer than 10 seconds on the rapid gait test, as described in the text.

[†] Defined as a score of ≥ 16 on the Center for Epidemiologic Studies Depression Scale (CES-D).

Table 2

The incidence rates of restricting back pain

		Number of Months Followed	Number of Episodes	Rate (95% CI) per 1000 person months [*]	P Value [†]
Overall		46534	1528	32.9 (29.8–36.3)	N/A
		16942	403	24.4 (20.2–29.6)	<0.001
By sex	<i>Male</i>	30042	1125	37.5 (33.5–42.0)	
	<i>Female</i>	14185	504	35.5 (29.9–42.2)	0.33
By age (years) at baseline	70–74	14816	437	29.5 (24.5–35.5)	
	75–79	12725	450	35.4 (29.5–42.4)	
	80–84	4808	137	28.5 (20.5–39.6)	
	85+				

* Estimated using a Poisson regression model with adjustment for over dispersion.

† Derived from Wald test for type 3 analyses on rate differences between sex or age groups using a Poisson model.