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Prevalence and impact of pain among older adults in the United States: Findings from the 2011 National Health and Aging Trends Study

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ABSTRACT

This study sought to determine the prevalence and impact of pain in a nationally representative sample of older adults in the United States. Data from the 2011 National Health and Aging Trends Study were analyzed. In-person interviews were conducted in 7601 adults ages ⩾65 years. The response rate was 71.0% and all analyses were weighted to account for the sampling design. The overall prevalence of bothersome pain in the last month was 52.9%, afflicting 18.7 million older adults in the United States. Pain did not vary across age groups ($P = 0.21$), and this pattern remained unchanged when accounting for cognitive performance, dementia, proxy responses, and residential care living status. Pain prevalence was higher in women and in older adults with obesity, musculoskeletal conditions, and depressive symptoms ($P < 0.001$). The majority (74.9%) of older adults with pain endorsed multiple sites of pain. Several measures of physical capacity, including grip strength and lower-extremity physical performance, were associated with pain and multisite pain. For example, self-reported inability to walk 3 blocks was 72% higher in participants with than without pain (adjusted prevalence ratio 1.72 [95% confidence interval 1.56–1.90]). Participants with 1, 2, 3, and ⩾4 sites of pain had gait speeds that were 0.01, 0.03, 0.05, and 0.08 meters per second slower, respectively, than older adults without pain, adjusting for disease burden and other potential confounders ($P < 0.001$). In summary, bothersome pain in the last month was reported by half of the older adult population of the United States in 2011 and was strongly associated with decreased physical function.

1. Introduction

Population aging is occurring in nearly every country of the world [48]. Not only are the number and proportion of older adults increasing globally, but the older adult population itself is getting older as well. Gains in life expectancy at older ages have fueled the rapid growth of the oldest-old segment of the population, although it is unclear whether improvements in functional status of older adults have kept pace [14,20,21,52]. Considering that disability in late life is a major predictor of medical and social service need, investigating risk factors for functional decline is a major public health priority.

Pain is one of the most widely cited symptoms underlying disability among older adults [18,34,40]. For instance, in a population-based cohort of moderately-to-severely disabled women, pain was the most commonly endorsed cause of disability in basic activities of daily living (eg, bathing), instrumental activities of daily living (eg, housework), and mobility function (eg, walking a quarter of a mile) [34]. Although these findings have been observed in other community-based studies of older adults, the epidemiology of pain in older adults is not well established. For example, the overall prevalence of pain estimated in previous studies ranges considerably from 24% to 72% [2,3,5,7,13,26,27,51,63]. Further, the age pattern of pain is not well characterized, as some studies suggest an increased prevalence with advancing age while others report a flat or decreasing prevalence [28]. Much of the variance in prevalence estimates can be attributed to inadequate sampling of the oldest-old in the community and in residential care settings, and to differences in survey methods and case definitions. The effects of dementia status and cognitive function of respondents on prevalence estimates is unclear, and the role of proxy respondents has not been investigated. In addition to the uncertainties in pain prevalence among older adults, the impact of pain has primarily been assessed with self-reported functional outcomes. Relatively few studies have examined the impact of pain using objective, physical

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performance measures that can capture a wide range of function and that are now used in geriatric patient assessment.

We sought to determine the prevalence and impact of pain in a large, nationally representative sample of older adults in the United States. Specifically, the aims of the current study were to 1) determine the overall prevalence of pain according to demographic and health characteristics; 2) determine the prevalence of pain at specific anatomic sites and the total number of pain sites according to age and sex; 3) evaluate the effects of cognitive function, dementia status, residential care status and proxy respondents on pain reporting and the age-to-pain relationship; and 4) assess the impact of overall pain and multisite pain on grip strength, gait speed, and lower-extremity physical performance as well as on self-reported function. Considering that the numbers of older adults with multiple chronic conditions are large and will continue to grow, there is a critical need to assess the burden of pain in the older adult population.

2. Methods

2.1. Study population

The National Health and Aging Trends Study (NHATS) was designed to investigate multiple aspects of functioning in later life and is funded by the US National Institute on Aging, National Institutes of Health [29]. In 2011, a stratified, multistage sampling design was used to enroll 8245 adults ages 65 years and older into the study. The sampling response rate was 71% (8245/11,637) and the sample, which was drawn from the Medicare enrollment file, represents Medicare beneficiaries living in the contiguous United States. Medicare is the national health care insurance program that is used by 96% of all older adults in the United States. Written informed consent was obtained from all study participants or their proxy respondents, and the study protocol was approved by the Johns Hopkins University Institutional Review Board.

In-person interviews, including cognitive and physical performance assessments, were completed by trained survey research staff in the homes of study participants living in the community or in residential care facilities (eg, retirement or assistive living communities), but not in participants who were residing in nursing homes and who were not expected to return to their original home residence. Therefore, 468 (5.7%) nursing home residents were excluded from the data analysis. Persons in all other residential care settings are represented in the study sample (weights for those with sample person interviews, n = 353, were adjusted to represent those who were not interviewed, n = 168) [41]. Also excluded were persons missing data on the pain measures (n = 5). The final analytic sample size of the current study was 7601, which is representative of 35.3 million older adults residing in the US. Participants that were excluded from the current study were older ($P < 0.001$) and more likely to be female ($P < 0.001$) than those included.

2.2. Measures

During the interview, participants were asked, "In the last month, have you been bothered by pain?" For participants who were too sick and/or unable to communicate (n = 579, 7.6%), proxy respondents were asked, "In the last month, has he/she been bothered by pain?" Those who responded "yes" were asked to report where they had pain in the last month by looking at a card with the following anatomic sites listed: back, hips, knees, legs, feet, hands, wrists, arms, shoulders, stomach, head, and neck. Participants could also specify other sites that were not listed, but this information was not analyzed. Each of the listed anatomic sites, as well as the total number of sites, was examined. The side of the body where pain occurred was not recorded and therefore, pain in the right and left hip, for example, would be counted as a single pain site.

Several measures of physical capacity that represent the building blocks of daily function were included in the study [19,22]. The ability to do the following 6 pairs of activities in the last month was assessed by self-report: 1) walk 6 blocks (about ½ mile)/walk 3 blocks; 2) walk up 20 stairs/walk up 10 stairs; 3) lift and carry 20 pounds/lift and carry 10 pounds; 4) kneel down without holding on to anyone or anything/bend over without holding on to anyone or anything; 5) put a heavy object on a shelf overhead/reach up over head; and 6) open a sealed jar using hands only/grasp small objects. For each pair, the first activity is generally more challenging than the second; therefore, respondents who were able to do the more difficult activity were not asked about the second, easier activity and were assumed to be able to do it. Those who reported "no" or "don't know" to the first activity, were asked the second. A composite score of self-reported physical capacity was computed by summing the total number of activities the respondent reported they were able to do. Scores ranged from 0 to 12, with higher values indicating greater physical capacity.

Physical performance was also assessed during the home interview. Grip strength was measured in kilograms (kg) by having participants squeeze a dynamometer as hard as they could. The maximum recorded strength from 2 trials was analyzed. Lower-extremity function was assessed with the Short Physical Performance Battery (SPPB), which is a widely used summary measure that incorporates standing balance, gait speed, and ability to rise from a chair [23,24]. For the balance component, participants were asked to stand and maintain their feet in side-by-side, semi-tandem (heel of one foot beside the big toe of the other foot), and tandem (heel of one foot in front of and touching the other foot) positions for 10 seconds each. The more difficult balance tests were not given when a participant was unable to hold an easier test for the full 10 seconds. Gait speed was assessed by having participants walk at their usual pace over a 3-meter course from a standing start. Participants were allowed to use a cane (n = 185) or a walker (n = 214) if necessary; the assessment and scoring protocols remained the same regardless of whether a walking aide was used. The faster of 2 timed trials was analyzed. Finally, participants were asked to rise from a chair and return to the seated position 5 times as quickly as possible while keeping their arms folded over their chest. The time to complete the 5 chair rises was recorded. All 3 components of the SPPB were scored from 0 to 4, with 0 indicating the inability to complete the test and 4 indicating the highest level of performance. Participants who were able to complete the walking and chair-rise tasks were each scored 1 to 4 based on quartile cut-points from normative data on community-dwelling older adults [24]. The following scores were assigned for the balance component: 0 if participants were unable to hold the side-by-side position for 10 seconds, 1 if participants could only hold the side-by-side standing position for 10 seconds; 2 if they could hold a semi-tandem position for 10 seconds, but were unable to hold a full-tandem position for more than 2 seconds; 3 if they could stand in a full-tandem position for 3 to 9 seconds; and 4 if they could stand in a full-tandem position for 10 seconds. The composite SPPB score is the sum of the balance, walking, and chair-rise subscores and ranges from 0 to 12 possible points, with higher values reflecting better lower-extremity function. In addition to grip strength and SPPB scores, gait speed was examined in meters per second (m/s) as a separate variable given its salience in daily function and clinical use. All 3 measures are powerful predictors of various adverse outcomes in older adults, including hospitalization, disability, and mortality [12,61].

Cognitive function was assessed using tests of verbal recall (ie, memory) and orientation [29]. Ten words (common nouns) were read out loud to participants, who were then immediately asked