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Association of Chronic Widespread Pain With Objectively Measured Physical Activity in Adults: Findings From the National Health and Nutrition Examination Survey

Elizabeth J. Dansie,* Dennis C. Turk,* Kathryn R. Martin,† Dane R. Van Domelen,‡ and Kushang V. Patel*

**Department of Anesthesiology & Pain Medicine and Center for Pain Research on Impact, Measurement, & Effectiveness, University of Washington, Seattle, Washington.*
†Epidemiology Group, School of Medicine and Dentistry, University of Aberdeen, Aberdeen, Scotland.
‡Department of Biostatistics and Bioinformatics, Rollins School of Public Health, Emory University, Atlanta, Georgia.

Abstract: Chronic widespread pain (CWP) is a common and potentially debilitating disorder. Patterns of physical activity (PA) in adults with CWP have primarily been investigated using subjective, self-report measures. The current study sought to characterize PA among community-dwelling individuals with CWP, chronic regional pain, or no chronic pain using objective measurements obtained via accelerometry in the 2003 to 2004 National Health and Nutrition Examination Survey. Data from 3,952 participants ages 20 and older were analyzed to assess relationships between pain status and objective measurements of PA. Prevalence of CWP was 3.3% and 5.4% in men and women, respectively. In men and women, the average activity counts per minute and time spent in moderate-to-vigorous PA were significantly lower for the CWP group than for the no chronic pain group. Interestingly, time spent in sedentary, light, and lifestyle activities was not associated with pain status. Statistical interaction tests indicated that the effects of chronic pain on counts per minute were stronger in men than in women. Despite recommendations for increased moderate-to-vigorous PA as a pain management strategy for CWP, results from this nationally representative study indicate that adults with CWP participate in less moderate-to-vigorous PA than individuals without chronic pain.

***Perspective:** Using objective measurement of PA in a nationally representative sample, this study demonstrates that adults with CWP participate in reduced daily and moderate-to-vigorous PA in comparison to people with no chronic pain. Findings indicate that clinicians should emphasize the importance of increasing PA in patients with CWP.*

***Key words:** Physical activity, chronic widespread pain, accelerometry, survey, actigraphy.*

Chronic widespread pain (CWP), the core feature of fibromyalgia (FM), is a potentially debilitating disorder that is commonly associated with pain hypersensitivity, often mechanical hyperalgesia.[26] Approximately 4 to 11% of the U.S. population reports experiencing CWP,[10,17,49] with women being 1.5 times more likely to report CWP than men.[9] CWP is positively associated with emotional dysfunction,[10,12,16] poor sleep quality,[16] and reduced health-related quality of life.[2,3,37] Many people with CWP have reduced cardiorespiratory fitness,[6,8] lead predominately sedentary lifestyles,[6,32] and report low levels of physical activity (PA).[32] Limitations in PA are pervasive and related to significant problems acknowledged by the majority of people with CWP, such as increased fatigue and depression.

Research has consistently found that aerobic exercise is a beneficial treatment for FM and CWP.[5] In fact, the

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Address reprint requests to Kushang V. Patel, PhD, MPH, Department of Anesthesiology & Pain Medicine, University of Washington, 1959 NE Pacific Street, Box 356540, Seattle, WA 98195-6540. E-mail: kvpatel@uw.edu

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American Pain Society Guideline recommends that FM patients (and thus those with CWP) perform exercise of moderate intensity 2 or 3 times per week,[4] with increases in exercise occurring in a slow and gradual fashion to avoid exercise-induced exacerbation of pain that may lead to high attrition from exercise programs.

Most of the previous investigations characterizing PA in people with chronic pain disorders including CWP have relied on self-reported measures to assess PA. However, self-reported assessments of pain and PA are influenced by many factors such as recall biases,[13] socially desirable responding,[41] environmental factors, and participants' current mood and pain intensity.[19] As a complement to self-report, technological advances that permit ongoing recording of activity using objective measurement (eg, accelerometry) overcome some of the biases inherent in self-reports of PA, providing real-time data on the duration, intensity, and patterns of PA. Unlike self-report measurements of PA that assess a static, single point in time or average responses over a recalled period, accelerometry can be used to characterize PA continuously and relatively unobtrusively within and across days in a free-living context.

Prior research has demonstrated only modest correlations between self-reported and objective measures of PA in general, where correlations have been shown to range between −.14 and .53.[41] Within chronic pain populations, these relationships are often even weaker[21,33,46] and may indicate that individuals with chronic pain find self-reporting PA more difficult or interpret assessments of PA differently than those without pain. However, objective measurements should not be advocated to replace self-reports of PA, as both can contribute to the understanding of the effect of pain on perceived and actual participation.

Few studies have used accelerometry to characterize PA in adults with chronic pain disorders, specifically CWP and FM.[7,23,24,33] Although these studies are informative, they assessed small clinical samples with limited demographic and geographic diversity, reducing the generalizability of the findings. Accordingly, we sought to investigate patterns of PA in a population-based sample of adults with and without CWP, utilizing the National Health and Nutrition Examination Survey (NHANES). The NHANES is the first survey to measure PA objectively in a large, nationally representative sample of people living in the United States.[44] The purpose of the current study was to quantify PA at various levels of intensity and patterns in adults reporting regional chronic pain and CWP, and estimate differences in activity according to chronic pain status among adults in the United States. Characterizing differences in PA in a national sample can help identify target populations for PA promotion and the development of interventions that increase the volume and intensity of PA that is lower in adults with chronic pain. We hypothesized that individuals with regional pain or CWP would evidence decreased PA in comparison to adults without chronic pain.

Methods

Study Design and Population

The U.S. National Center of Health Statistics conducts the NHANES to assess and monitor the health and nutritional status of the U.S. population. A complex multistage sampling design is used to identify and recruit a nationally representative sample of the U.S. civilian, noninstitutionalized population, aged 2 years and older. Certain populations are oversampled to provide reliable estimates of health conditions, including Mexican Americans, African Americans, and individuals ages 12 to 19 and 60 years and older. The survey consists of both a home interview and a physical examination in a mobile examination center or at home, where various biological markers of health were ascertained. An important feature of the 2003 to 2004 NHANES was that all ambulatory individuals ages 6 and older were invited to wear an accelerometry monitor up to 7 consecutive days to capture objective measurements of PA.[44] In this study, we made use of the NHANES database and included all participants with at least 1 valid day of accelerometry data, defined as ≥10 hours of wear-time. All participants provided written informed consent, and the protocol was approved by the institutional review board of the National Center for Health Statistics.

Demographic and Health Status Measures

During the home interview, gender was recorded, and participants were asked to report their race/ethnicity, date of birth, and highest grade of education completed (categorized as less than high school, high school or General Educational Development, and more than high school). Measured height and weight were used to calculate body mass index (BMI) (weight in kilograms divided by height in meters squared). For medical conditions, participants were asked whether a doctor ever told them that they had any of the following: arthritis, diabetes mellitus, asthma, cancer (nonskin), pulmonary disease, myocardial infarction, congestive heart failure, and stroke. Mental health was assessed with the following question, "Now thinking about your mental health, which includes stress, depression, and problems with emotions, for how many days during the past 30 days was your mental health not good?"

Pain Classification

The questionnaire module on pain was collected in adults aged 20 years and older.[43] In order to classify individuals according to pain status, participants were asked, "During the past month, have you had a problem with pain that lasted more than 24 hours?" If the participant answered yes, this was followed with the question, "For how long have you experienced this pain?" Participants were subsequently asked to report the bodily region(s) of their pain by indicating all regions in which they experienced pain (from a total of 32 regions, such as head, right upper arm, left chest) on a pictorial manikin displaying the front and back of a human figure.