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Research Paper

The descriptive epidemiology of daily sitting time as a sedentary behavior in multiple sclerosis

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Abstract

Background: Sedentary behavior is pervasive among the general population, but little is known about the epidemiology of this behavior in multiple sclerosis (MS).

Objective: We compared self-reported sitting time (ST), as a measure of sedentary behavior, between persons with MS and healthy controls, and examined ST across demographic and clinical characteristics of those with MS.

Methods: 1081 persons with MS and 150 healthy controls self-reported ST based on the International Physical Activity Questionnaire (IPAQ), and completed the Godin Leisure-Time Exercise Questionnaire (GLTEQ) and a demographic/clinical scale. Data were analyzed using analysis of variance, bivariate correlations, and stepwise regression analysis.

Results: There was not a significant difference in ST between persons with MS and controls ($F = 0.01$, $p = 0.95$), and persons with MS reported 450.9 ± 220.6 min of ST per day. ST was weakly associated with GLTEQ scores in MS ($r = -0.21$, $p < 0.001$), but not controls. ST significantly differed as functions of marital status, physical activity level, employment status, education, and degree of ambulatory impairment among those with MS.

Conclusions: ST does not differ between persons with MS and healthy controls, but those with MS report a large amount of this sedentary behavior that is potentially an independent correlate of health and disease outcomes.

Keywords: Multiple sclerosis; Sedentary behavior; Sitting; Health behavior; Physical inactivity

Sedentary behavior (i.e., behavior involving sitting or lying that does not increase energy expenditure during the waking hours) is pervasive among adults in Western countries[1] and world-wide.[2] Adults in countries around the world accumulate between 3 and 8 h of sitting time (ST) per day.[2] ST has been detrimentally associated with disease risk factors such as blood glucose and obesity,[3] as well as increased risks of morbidity and mortality[2,4] independent of physical activity. Accordingly, researchers have begun focusing on sedentary behavior, particularly reducing or breaking-up daily ST, as an important target of behavioral interventions for reducing health risks.[5,6]

To date, the majority of research on sedentary behavior has focused on the general population without a chronic disease condition, and there is minimal research on sedentary behavior in adults with progressive diseases that result in mobility disability[7] such as multiple sclerosis (MS). MS is a common immune-mediated disease of the central nervous system (CNS) that causes axonal demyelination, transection, and loss as well as neurodegeneration over time. Such damage of the CNS tissue results in the clinical expressions of MS that progressively result in the accumulation of ambulatory impairment.[8] The clinical expression of MS and associated ambulatory impairment might increase the rate of sedentary behavior in persons with MS. One small study has quantified sedentary time as an estimated 8 h per day in persons with MS.[9] This study indicates that sedentary time differs based on disability status, but did not examine other variables for a good description of demographic and clinical variables that might explain differences in ST. There further was not comparison with controls.

The present study involved a secondary, exploratory analysis of existing data and compared self-reported ST

Ethics approval: The University of Illinois at Urbana–Champaign's Institutional Review Board approved this study. All participants gave written informed consent before data collection.

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between persons with MS and controls without MS or any other disease conditions. We secondly examined self-reported ST among demographic and clinical characteristics of persons with MS. This paper provides additional information regarding the possible public health crisis involving ST in persons with MS, and potentially identifies a new avenue for behavioral interventions for improving health and possibly disease status in this population, if there is a high rate of sedentary behavior.

Method

Participants

The current study involved a secondary analysis of data amalgamated from 13 previous investigations[10–22] of physical activity and its associations with quality of life, social cognitive and symptomatic outcomes; all data from those investigations had been previously de-identified. Studies were included in the data amalgamation that included an assessment of clinical characteristics (i.e., disability status and disease duration), sociodemographic variables (i.e., sex, age, BMI, education, etc.), and ST (questions 7 of the International Physical Activity Questionnaire (IPAQ)). There were 13 studies that contained those data and the de-identified data were compiled across those studies into a single data set for analyses. MS participant recruitment occurred throughout the United States, but primarily within the Midwest and the state of Illinois. Potential participants were contacted through print and email flyers and advertisement on the National Multiple Sclerosis Society website. Healthy controls were recruited through the University community via public email postings. Persons with MS were recruited based on the following common inclusion criteria: (1) diagnosis of MS; (2) relapse-free in the previous 30 days; and (3) ambulatory with or without assistance. The final combined samples of convenience included 1081 persons with MS and 150 healthy controls.

Self-report ST and physical activity measures

ST was measured using item seven from the abbreviated version of the IPAQ,[23] and scores from this item have been validated with accelerometry.[24] This item reads, ‘‘During the last 7 days, how much time did you spend sitting on a weekday?’’ The item further has instructions regarding the location and opportunity for ST such as at work or home and while doing course work or during leisure time. The item includes examples of sitting activities such as sitting at a desk, visiting friends, reading, or watching television. Participants indicated their ST by writing in the number of hours in a single blank below the instructions.

Physical activity was measured with the Godin Leisure-Time Exercise Questionnaire (GLTEQ).[25] The GLTEQ measures the frequency of strenuous, moderate, and mild leisure time physical activity performed for periods of 15 min or more over a usual week. The overall GLTEQ score was calculated by multiplying the frequencies of strenuous, moderate, and mild by 9, 5, and 3 METs, respectively, and yielded a continuous measure of leisure physical activity in arbitrary units.[26]

Disability status

The Patient Determined Disease Steps (PDDS)[27,28] scale is a single-item, self-reported measure of disability status. The PDDS ranges from 0 (Normal) to 8 (Bedridden), and has been recommended as a surrogate for the physician-rated Expanded Disability Status Scale (EDSS)[28] when neurological examination is not suitable (e.g., survey-based research). Scores from the PDDS have been strongly and linearly associated with EDSS scores ($r = 0.783$).[28] PDDS scores were trichotomized into groups of ambulatory disability. Scores of 0–2 were categorized as ‘‘no ambulatory impairment,’’ scores of 3–4 were categorized as ‘‘mild ambulatory impairment’’ and scores above 5 were categorized as ‘‘moderate-severe ambulatory impairment.’’ Similar classifications have been reported previously.[29,30]

Sociodemographic and clinical variables

Sociodemographic and clinical characteristics were measured with a standard scale. Sex, age, body mass index (BMI), marital status, number of children, employment status, race, education, and income were included as sociodemographic variables. The following sociodemographic variables were collapsed into groups for ease of analysis: age (18–39 vs. 40–59 vs. >60), BMI (normal vs. overweight vs. obese), marital status (married vs. unmarried), children (no children vs. children), race (Caucasian vs. non-Caucasian), education (college graduate vs. non-college graduate), and income (<$40,000/year vs. >$40,000/year). Clinical course of MS was determined by standard definitions[31] and disease duration was identified as the time since the date of confirmed MS diagnosis. The following clinical variables were collapsed into groups as a justifiable means to segment the data for clinically relevant groups: disease type (Relapsing Remitting MS vs. Progressive MS), PDDS (no impairment, mild ambulatory impairment and moderate-severe ambulatory impairment), and disease duration (<10 years, 10–20 years, and >20 years).

Procedure

All studies were approved by the same University Institutional Review Board, and all data were de-identified before amalgamation. All participants provided written informed consent. Participants were either sent a battery of questionnaires through the United States Postal Service (USPS) with a stamped, pre-addressed return envelope or completed questionnaires during a baseline testing session in the laboratory. If the questionnaires were received via