Original Research

Physical Activity in Community-Dwelling Stroke Survivors and a Healthy Population Is Not Explained by Motor Function Only

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Objectives: To explore the relationship between self-reporting and physical measures and compare self-reported physical activity (PA) levels in persons who have had a stroke with self-reported PA levels in a control population.

Design: Cross-sectional assessment of a convenience sample of survivors of a stroke living in the community and a population-based sample from the same community.

Setting: University hospital.

Participants: Seventy persons (48 men and 22 women; average age, 60 years) who had a stroke a mean of 6 years earlier and 141 persons (70 men and 71 women; average age, 59 years) who served as control subjects.

Main Outcome Measurements: The Physical Activity Scale for the Elderly (PASE) was used, and self-selected and maximum walking speeds were measured. Motor function after stroke was assessed with the Fugl-Meyer Assessment.

Results: The median Fugl-Meyer score for motor function in the leg was 29. Mean self-selected and maximum walking speeds after having a stroke were 1.0 m/s and 1.3 m/s, corresponding to 72% and 65% of control values. A regression model with PASE as the dependent variable and age and walking speed as independent variables explained 29% ($P < .001$) of the variation in the stroke group. For the control group, age and self-selected walking speed explained 8% of the variation ($P < .01$). The mean PASE score in the stroke group was 119, compared with 161 in the control group.

Conclusion: Persons who have experienced a stroke and live in the community are less physically active than the population of the same age who have not had a stroke. However, it appears that factors other than motor impairment have an impact on a person's PA level, because only a low association was found between PA level and motor function, with a large dispersion in PA levels in persons with a history of stroke who were physically well recovered.

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INTRODUCTION

To prevent cardiovascular health problems, an active lifestyle with daily physical activity (PA) is recommended for all persons [1]. PA is defined as any activity involving energy expenditure, whereas physical exercise is defined as planned, regular training that aims at an increase in physical performance. Most stroke guidelines advocate PA as secondary prevention [2], and PA is part of stroke rehabilitation. Stroke often is observed in combination with comorbidities that are amenable to reduction with exercise. It has been shown that PA reduces the risk of stroke, stroke severity, and further consequences [1,3,4]. A risk of a decrease in physical capacity occurs with time, and it is hypothesized that regular PA can prevent recurrent stroke and increase well-being [5]. Therefore it is important to continuously assess PA levels after a stroke occurs and to identify persons who need support to increase their PA level, which may be lower than optimal [6]. The need exists to assess larger (>50) cohorts of stroke survivors and to compare their activity levels with the general population who reside in the same area.

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Because a person's PA level may be influenced by many variables, including physical, psychological, and environmental factors [7], the PA level is rather difficult to measure or assess in a reliable and valid manner. Depending on the purpose of the measurement, different methods may be appropriate. The most objective measure is to use an activity monitor, such as an accelerometer or heart rate monitor, during all waking hours for several days, although the reliability of such monitors depends on the exerciser's compliance with the use of these devices. Activity diaries are frequently used, but completing and interpreting them are time consuming. Questionnaires for self-reporting of PA are cost-efficient and easy to administer, but the reliability of self-reporting may be questionable.

The Physical Activity for the Elderly (PASE) questionnaire includes questions regarding leisure, household, and occupational activities. The physiological load of the activities is incorporated as weighting in the calculation of scores. The PASE initially was developed in an elderly population-based study and was validated against accelerometer counts together with an activity diary, and it has been shown to have good reliability and validity [8,9]. The PASE has been found to correlate with measures of strength, aerobic activity, and balance capacity in persons with a mild stroke [10]. PASE has been used in a few studies of persons who have had a stroke [11-13] and was regarded as a useful instrument for assessment of PA levels.

AIMS

The aims of this study were to explore the relationship between self-reported PA levels and physical measurements and to compare persons who had a stroke with a population-based sample.

METHODS

Study Populations

A convenience sample of 70 community-dwelling volunteers who had previously had a stroke was gathered. Inclusion criteria were a diagnosis of stroke according to the criteria of the World Health Organization that occurred at least 6 months in the past, produced hemiparesis at onset, and affected walking ability (use of a walking aid or ankle foot orthosis in this study was permitted). Exclusion criteria were severe heart disease, uncontrolled hypertension, non–stroke-induced gait disability, and inability to follow instructions or to communicate in Swedish.

A population between 40 and 79 years of age from the population database was selected randomly. A total of 639 persons were invited by mail to participate in the study, and 141 (22%; 70 men and 71 women) volunteered. They were, in their own opinion, "in good health" and were considered clinically healthy after a review of medical history and

examination by a physician. Both groups came from the same urban area. The Declaration of Helsinki was followed. The study was approved by the Ethics Committee of the University of Gothenburg, and the participants provided informed consent.

Procedure

Both groups were tested at the same university hospital. Gender, age, height, and weight were recorded, and body mass index (BMI) was calculated. In the participants who had a stroke, the diagnosis, stroke localization, and time since onset were registered and the lower extremity motor function was assessed with the Fugl-Meyer Assessment scale (FMA) [14], sections E and F. Each movement was scored on a 3-point ordinal scale and summed to a total score, with a maximum of 34 indicating good voluntary motor control. On the basis of the FMA score, motor impairment was classified as severe (<17), marked (17-28), moderate (29-31), slight (32-33), or none (34).

PA level was estimated with use of a Swedish translation of the PASE questionnaire [8] , which was administered in an interview. The PASE comprises 12 questions on PA performed during the previous week. PAs include walking; light, moderate, and strenuous sports; strength training; light and heavy household work; home repair; lawn work; gardening; caring for another person; and paid or voluntary work involving standing or walking. The type of activity (with given examples), frequency during the past week (none, 1-2, 3-4, or 5-7 days), and time spent (<1 hour, 1 to <2 hours, 2-4 hours, or >4 hours) are registered. Household activities and work were answered with "yes" or "no" responses. Work is specified and supplemented by the number of hours spent standing and walking. To calculate the score, the activity's weight is multiplied by the time spent, giving a total score of PA during the past 7 days. A high score indicates a greater level of PA. The total score can range between 0 to more than 400, with no maximum explicitly specified.

The PASE score was calculated according to the PASE manual [15]. The responders who acknowledged having engaged in light, moderate, or strenuous sports or strength training in the past week were defined as exercisers. Subjects who reported not having performed the aforementioned activities were defined as nonexercisers. Two walking tests, one at a self-selected speed and one at the maximum speed, were performed on a 30-m indoor track in a corridor, and the time was measured with a stopwatch [16]. The self-selected and maximum walking speeds were then calculated. The persons with a history of stroke were permitted to use their usual walking aid and/or ankle foot orthoses if needed. Each stroke participant's individual PASE score and walking speeds were matched with age and gender corresponding mean values in the control cohort.