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Walking speed in older physically active adults – one-year follow-up study

Joachim Ring[i], Thomas Hellstén[ii], Jyrki Kettunen[iii]

Abstract

Walking is important for maintaining physical function. Gait-speed test is a reliable measure of functional capacity and it is easily implemented in clinical settings. The aim of our study was to investigate gait speed in one-year follow-up study among older physically active adults living at home independently. Subjects (N=27) were people aged 65+, who participated in clinical tests at Arcada in February 2017 (baseline) and in February 2018 (follow-up). Normal and brisk gait speeds during a 10-meter distance indoors were calculated for each participant. During the one-year follow-up period, the average normal gait speed decreased among the subjects from 1.56 m/s to 1.48 m/s. None of the baseline variables studied explained the change in gait speed in our subjects. In conclusion, the decline in gait speed during the one-year follow-up among physically active older adults seems to be small. This is in line with the findings that health status, and physical functioning of the subjects remained rather good during the follow-up.

Keywords: walking speed, physical function, older adults

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1 INTRODUCTION

There are many different physical performance measures available to determine a person's functional capacity. The ability to walk is one of the key functions to maintain independent living. Besides walking ability, walking speed has been of interest to scientists. In his classic study, Bohannon [1] pointed out that gait-speed measures during a single test are reliable, gait speed decreases with increased age, and that maximum gait speed declines more steeply than normal (comfortable) gait speed with increasing age. The author also concluded that both maximum and normal gait-speed measures were reliable, and correlated significantly with age, height, and lower-limb strength. Studenski et al. [2] stated that a normal gait-speed test is a quick, inexpensive and reliable measure of functional capacity with high inter-rater and test-retest reliability, and gait-speed represents one test form that can be easily implemented in clinical settings and as a standard clinical evaluation of older adults [3].

In their systematic review, Bohannon & Andrews [4] combined data from 41 articles, and calculated normal gait speed for healthy individuals among different age groups. According to meta-analysis, the gait speed was relatively consistent for the decades from 20 to 29 years, and from 60 to 69 years for both genders. Thereafter, the average gait speed seems to decline in both genders. For men, within the ages of 60-69 years, 70-79 years and 80-99 years the average gait speed was 1.339 m/s, 1.262 m/s and 0.968 m/s, respectively. For women the corresponding speed was 1.241 m/s, 1.132 m/s and 0.943 m/s. Among the subjects aged 80 years or more, the average gait speed was below 1 m/s.

A systematic review by Peel and co-workers [5] focused on gait speed among geriatric patients in clinical settings. They found that age, type of start (static or moving), permitted walking aid, and distance were not significantly associated with gait speed. Interestingly, they found that the reported average gait speeds were higher among younger than older publications. Moreover, the effect of a higher proportion of female subjects in the study population produced a decreased mean gait speed. The average gait speed "increased" by 0.013 m/s per year of publication, which ranged from 1988 to 2011. For every percentage increase in the proportion of female participants in the study population, there was an incremental decrease in gait speed of 0.003 m/s. Gait speed measured using maximal compared with usual pace was significantly faster by 0.302 m/s.

Cesari and co-workers [6] investigated walking speed as a prognostic factor for health problems among well-functioning older adults. They found that a normal gait speed of less than 1 m/s identifies persons at high risk of health-related outcomes. Participants with a gait speed of less than 1 m/s presented a significantly higher risk of persistent lower-limb limitation, persistent severe lower-limb limitation, hospitalization and death within one year. In addition, the relationship between walking speed and risk of falling is of interest. Verghese et al. [7] pointed out that each 0.1 m/s decrease in gait speed was associated with a 7% increased risk for falls, and participants with a slow gait speed (≤ 0.7 m/s) had a 1.5-fold increased risk for falls compared with those with normal gait speed.

We have had the possibility to follow a cohort of well-functioning older adults who have participated in weekly group exercise sessions in Arcada University of Applied Sciences located in Helsinki (Arcada). In this one-year follow-up study, we investigate gait speed among older physically active adults living at home independently. We were especially interested in the baseline factors explaining changes in gait speed during the follow-up.

2 MATERIAL AND METHODS

Detailed descriptions of the participants and methods have been previously reported [8] in Arcada working papers -series.

Briefly, the subjects (N=27) were well-functioning older adults aged 65+, who participated in clinical tests at Arcada in February 2017 (*i.e.* at baseline) and in February 2018 (follow-up). The participants also completed a standard pre-test health-screening questionnaire.

Documentation for each subject included age, sex, height, weight, body mass index (BMI, kg/m^2), and leisure time activity metabolic equivalent (MET) index [9, 10]. In addition, the subjects self-rated their functional capacity, state of health, and leisure time physical activity using an ordinal scale from 0 to 10. They also performed the “Timed-Up & Go” test (TUG) [11].

The last two tests were normal and brisk gait speeds. The gait speed was calculated for each participant by dividing the test distance in meters by the time required to traverse it in seconds. Photocells was used to measure the time the subjects walked a 10-meter distance indoors. The test started from a standing position, and the subjects walked 4 meters to accelerate and 4 meters to decelerate before and after the 10-meter test distance. For the usual pace walking trial, the subjects were instructed to walk at their normal, comfortable speed. For the brisk speed walking trial, they were asked to walk as fast as they could safely without running.

The ethical committee of the Hospital District of Helsinki and Uusimaa (HUS) approved the study protocol.

Statistical analysis
The statistical analysis was done with a Statistical Package for the Social Sciences 25.0 (IBM SPSS Statistics for Windows, Version 25.0. Armonk, NY: IBM Corp.). The descriptive data are presented as means and standard deviations (SD), and an independent samples t-test was used to analyse differences between genders. Repeated samples t-test were used to analyse changes in walking speed between baseline and follow-up. Pearson’s correlation coefficient was used to analyse the relationship between change in gait speed, and different covariates. Finally, we used a multiple linear regression analysis to investigate the factors explaining the variation in the change in gait speed.

3 RESULTS

All the subjects participated in the follow-up examination. The one and only difference between genders in age, BMI, health-related factors (Table 1), physical function or physical activity (Table 2) of the subjects at baseline was brisk gait speed. Male subjects had on average a slightly faster brisk gait speed compared to their female counterparts (Table 2).

Table 1. Characteristics of the subjects at baseline clinical examination in 2017.			
	Female	Male	P-value
	N=13	N=14	
Age; years, mean (SD)[1]	73.0 (3.0)	73.1 (4.0)	0.919
BMI[2], mean (SD)[1]	25.1 (4.0)	25.9 (2.9)	0.532
State of health[3], mean (SD)[1]	8.0 (0.8)	8.1 (1.3)	0.865
Health related quality of life[4], mean (SD)[1]	8.7 (0.9)	8.4 (0.9)	0.453
At least one physician-diagnosed chronic disease, % (n)	60 (9)	40 (6)	0.273
[1]SD: Standard deviation			
[2]BMI: Body Mass Index, kg/m²			
[3]Self-reported state of health with a scale from 0 to 10, where 10 is the best possible health			
[4]Self-reported health related quality of life with a scale from 0 to 10, where 10 is the best possible quality of life			

Table 2. Function and physical activity of the subjects at baseline in 2017.			
	Female (N=13)	Male (N=14)	Difference
	mean (SD)[1]	mean (SD)[1]	mean (95% CI)[2]
Timed up and go (TUG); seconds	8.5 (1.0)	8.8 (1.2)	-0.4 (-1.19 to 0.48)
Walking, normal speed; (m/s)	1.5 (0.2)	1.6 (0.1)	-0.2 (-0.14 to 0.10)
Walking, brisk speed; (m/s)	2.0 (0.3)	2.2 (0.2)	-0.2 (-0.4 to -0.1)
METh/week[3]	26.8 (28.5)	20.6 (15.0)	6.3 (-10.7 to 23.3)
[1]SD: Standard deviation			
[2]95% CI: 95% Confidence intervals			
[3]METh/week: Metabolic equivalent hours in week			

During the one-year follow-up period, the average normal gait speed decreased among the subjects (Table 3), but there was no gender difference in this change (mean male 0.12 m/s vs. mean female 0.03 m/s, P=0.169).

Table 3. Walking speed of the subjects in 2017 and 2018.			
	At baseline in 2017 (N=27)	At follow-up in 2018 (N=27)	Difference
	mean (SD)[1]	mean (SD)[1]	mean (95% CI)[2]
Walking, normal speed; (m/s)	1.56 (0.17)	1.48 (0.18)	0.08 (0.11 to 0.14)
Walking, brisk speed; (m/s)	2.11 (0.28)	2.15 (0.33)	-0.04 (-0.12 to 0.04)
[1]SD: Standard deviation			
[2]95% CI: 95% Confidence intervals			

We entered various variables in the correlation analysis to find the variables associated with the change in normal walking speed as a continuous variable. Surprisingly, there was no statistically significant association between the change in normal walking speed and different variables (all P-values between 0.178 and 0.919). Therefore, our data did not allow us to conduct further analysis to investigate the factors explaining the variation in the change in walking speed.

4 DISCUSSION

The aim of the study was to investigate the changes in the gait speed during a one-year follow-up among older physically active adults living at home independently. The mean normal gait speed decreased slightly among the subjects. Unfortunately, none of the baseline variables studied explained the change in gait speed in our subjects.

It is well known that walking ability is one of key functions to stay independent. Following the gait speed in older adults is one possibility to identify persons at risk. Cesari et al. [6] concluded in their prospective cohort study focused on well-functioning older adults that a normal gait speed less than 1 m/s identifies persons at high risk of health-related outcomes. In their sample, the mean normal gait speed was 1.17 m/s. Participants with a gait speed of less than 1 m/s presented a significantly higher risk of persistent lower-limb limitation, persistent severe lower-limb limitation, hospitalization and death within one year. Our study participants walked faster than those in Cesari and co-workers' study, and none of them had a gait speed slower than 1 m/s. These are in line with the findings that our subjects rated their health and function as rather good at baseline and at follow-up as well.

In contrast to Bohannon's study [1], where his conclusion was that maximum gait speed declines more steeply than normal gait speed with increasing age, in our study the normal gait speed declined during the follow-up time. However, our sample did not include subjects in poor health condition, and the follow-up time was only one year. In addition, the changes in gait speed were small.

Perera et al. [12] have published recommendations for criteria for meaningful change in gait speed. They recommended that the cut-off point of moderate (substantial) meaningful substantial change for normal gait speed is 0.10 m/s among older adults. The proportion with at least a 0.10 m/s decline in gait speed was 41% (n=11) in our study. However, there were no differences in state of health, or in physical functioning, nor in physical activity at follow-up between the subjects with or without decline in gait speed (all P-values >0.05).

In conclusion, the decline in gait speed during the one-year follow-up among physically active older adults seems to be small. This is in line with the findings that health status, and physical functioning of the subjects remained rather good during the follow-up.

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