The relations among physical sensations, body functions, and fall history elderly living at home

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ABSTRACT

There are many reports measuring muscular strength, equilibrium sensation and walking ability, etc. in order to reduce fall risk of the elderly. However, there are no studies based on the self-evaluation of the physical sensation and motor function of the elderly himself and the difference in self recognition by age. The purpose of this study is to investigate the relationship between motor function measurement in elderly people and self-evaluation of body sensation, motor function by interview and their fall history. There was a significant positive correlation between ADL and one-leg standing time with eyes open. However, there was no difference one-leg standing time between the groups which have fall experience or not.

Keywords: Community-dwelling elderly, Perception of physical function, Physical function, Fall history

1. Introduction

With Japan’s population aging rapidly, it is important that efforts be made to maintain self-reliant daily living. Preventative measures against falls and fall accidents of the elderly are urgently required for maintaining the quality of life of the elderly and for reducing costs of preventative nursing care and medical costs as they may lead to impairment of motor functions. Previous studies have reported the validity of one-leg standing time with eyes open, the Timed Up and Go test, and others as assessment methods for motor functions related to fall risk factors. However, there are no reports on changes with age in the perception of physical sensations and motor functions or the relation between the individual differences in the perception of physical sensations and of one’s motor functions.

The purpose of the present study was to investigate the relations between age and motor functions and fall experience and between fall experience and the perception of physical sensations by measuring motor functions and conducting an interview survey on the perception of physical sensations and of motor functions and fall history of the community-dwelling elderly living at home.

2. Method

2.1. Participants

The participants comprised 32 community-dwelling elderly people living at home (age 75.2 ± 6.4 years, height 150.2 ± 7.3 cm, weight 51.2 ± 8.8 kg, and mean right and left grip strength 215 ± 69 N) who were self-reliant in their daily lives at home and visited internal medicine clinics on a regular basis.

2.2 Measurement method and statistical processing

Grip strength and one-leg standing time with eyes open were measured, and ADL assessment was performed to assess motor functions. ADL assessment was performed with the purpose of assessing movement abilities of the elderly living at home (Demura, et al., 2000) and comprised 15 items used in the new physical fitness test for the elderly. The scale for fear of falling used as a change indicator for the functions of the musculoskeletal system (Tinetti, et al., 1994) was used, and assessment of knee and low back pain (VAS) was conducted as a subjective assessment of motor functions. Prior to conducting the interviews, we prepared an interview guide consisting of semi-structured questions based on the perspective of fall experience and situation, physical sensations and changes in them, perception of motor functions and countermeasures. The results of the interviews were compiled into a verbatim record, and statements related to the perspective of a question were extracted from the entire context and classified.

We calculated the Pearson correlation coefficient (r) and used unpaired student’s t-test or Mann–Whitney U test. The level of statistical significance was set at less than 5%.

3. Results

All participants were able to go out and walk around
independently. Of the items listed on the scale for fear of falling, the participants over the age of 65 to 69 responded that they were “worried” about “climbing up and down the stairs,” “bathing movements,” and “short walk”, in descending order. A significantly negative correlation between age and ADL \((r=-0.649, p<0.01)\) and a significantly positive correlation between age and the scale for fear of falling \((r=0.530, p<0.01)\) were noted. There was a significant positive correlation between ADL and one-leg standing time with eyes open \((r=0.694, p<0.01)\) while there was a significantly negative major correlation between ADL and the scale for fear of falling \((r=-0.750, p<0.01)\). On the other hand, there were slight correlations between age and one-leg standing time with eyes open \((r=-0.470, p=0.01)\) and between the scale for fear of falling and one-leg standing time with eyes open \((r=-0.436, p<0.05)\). Furthermore, the results of the comparison between the group with fall experience and the group without showed that ADL were significantly higher \((p<0.01)\) in the group without fall experience than in the group with fall experience while the group with fall experience scored significantly higher \((p<0.05)\) on the scale for fear of falling than in the group without. However, there was no difference between the two groups in knee and low back pain and one-leg standing time with eyes open.

Based on the interview data, we extracted words related to fall experience and situations, changes with age in physical sensations, current physical sensations, perception, and countermeasures and turned them into keywords. There was a total of 21 fall experiences. The fall rate against the number of participants that reached each age range was highest in the age range of above 75 and under 80. (44%), followed by those in the age range of above 70 and under 75 (eight cases: 33%).

Changes in physical sensations included slowing down of movements, stumbling over a step, decrease in the height of leg lift and insecurity when walking outside, difficulties in climbing up and down the stairs and walking long distances, and so on. The age at which the participants felt change ranged from 55 years to the 80s. The sensations experienced were similar among all age ranges with the major sensations extracted being easily fatigued (entire body, lower limbs) and declining physical strength after reaching the age of 75. Additionally, four participants experienced change after falling.

4. Discussion

The correlation analysis of age and motor functions suggests that ADL tend to gradually decrease and Scare for fear of falling increase with age even if one is self-reliant in daily life. One-leg standing time with eyes open is considered to reflect ADL as there was a significant correlation between ADL and one-leg standing time with eyes open. These results are largely in agreement with previous studies (Demura et al., 2000). On the other hand, the relevance between subjective fear of falling and one leg standing time with eyes open is weaker than that of the relationship between subjective fear if falling and ADL. In other words, compared with the perception of motor function in daily living, a decline in balance ability at standing may not lead to an increase in subjective fear of falling.

Fall situations were similar to situations in which the participants perceived a change in physical sensation. It is possible these results suggest that a decrease in and slowing down of motor functions for basic movements lead to a fall in many instances. Additionally, it is speculated that the fall experiences and changes in the perception of physical sensations are similar among all age range. Although preventative measures must be taken according to the fall risk factors of the participant regardless of age. Internal and external measures in accordance with the changes in physical sensations to maintain and assess motor functions are required. Going forward, we will conduct a detailed qualitative analysis of the interview data and increase the number of participants to extract movement characteristics that are possible fall risk factors by conducting a motion analysis.

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