Factors affecting activity restriction associated with fear of falling in elderly Japanese

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Factors affecting activity restriction associated with fear of falling in elderly Japanese

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Abstract

Fear of falling restricts activities of daily living and its range in elderly persons, despite their adequate mobility, and reduces physical function and quality of life. Since conducting numerous living activities on the floor is a Japanese custom, we investigated the influence of vertical downward movement while standing to clarify factors affecting activities restricted by fear of falling. The participants were community-living elderly with independent outdoor mobility. As the degree of fear of falling, self-efficacy in the execution of activities was evaluated. Study I: The participants were 31 elderly persons living in the community (7 males and 24 females) who gave informed consent. The mean age was 75.7±8.3 years (60-91 years). Items with significant differences in activity self-efficacy between the fearful and non-fearful groups were going up and down stairs ($p<0.01$), floor wiping ($p<0.05$), and immediate answering of the telephone ($p<0.05$). Study II: The participants were 54 community-living elderly persons (10 males and 44 females) aged 73.8±7.8 years (mean±SD; range: 65-91 years).

The objective of this study was to clarify the structure of factors affecting activities restricted by fear of falling via measuring the speed of reactions of physical functional factors reported to be associated with fear of falling and activities and motion suggested by Study I. Factors correlated with activity self-efficacy were timed up and go test (TUG) ($rs=-0.381$, $p<0.01$), times required for standing up from the floor ($rs=-0.334$, $p<0.01$), sitting on the floor ($rs=-0.369$, $p<0.01$), and going up and down a 15-cm step ($rs=-0.372$, $p<0.01$), lateral ($rs=-0.316$, $p<0.05$) and downward ($rs=-0.302$, $p<0.05$) movement times of the upper limbs in the standing position, and self-rated health ($rs=0.295$, $p<0.05$). Results of multiple regression analysis by the stepwise method, the downward movement time of the upper limbs ($p<0.05$) and TUG ($p<0.01$) were confirmed to be factors affecting fear of falling, suggesting that the vertical downward reactivity of the upper limbs while standing should be included in the evaluation of and intervention in fear of falling, in addition to mobility.

Key words

fear of falling, elderly, self-efficacy, motor function, movement time

Introduction

Fall-associated bone fracture and trauma are factors reducing independence in conducting activities of daily living. Following recent progress in studies on falling prevention, fear of falling[1] has been reported to be more problematic than falling itself[2)3)], and such a fear develops in elderly persons who have not experienced falling[4)]. The incidence of fear of falling in community-living elderly has been reported to be 25-55% in Europe and America[5)-9)] and 50-60% in Japan[10)11)], and activities were restricted due to fear of falling in 19

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–35% of these[8)12)]. Fear of falling restricts activities of daily living and its range in elderly persons, despite their adequate mobility, and reduces physical function and quality of life (QOL)[13)14)].

Fear of falling is measured by directly questioning participants on its presence or absence, or as activity self-efficacy. For measurement using self-efficacy, Tinetti et al.[16)] developed the falls efficacy scale (FES) to measure the degree of fear of falling based on the self-efficacy theory proposed by Bandura[15)]. Several indices have been subsequently developed[13)18)19)], and the usefulness of the combination of several indices to identify individual problems has been reported[20)].

In studies on fear of falling and physical function performed in Europe and America, fear of falling was significantly higher in a group with reduced equilibrium function and mobility[17)21)22)], showing the association of the fear with evaluation items of motor function involving standing and moving. However, more community-living elderly persons with independent outdoor mobility report difficulty in standing up from and sitting on tatami mats rather than a reduction of physical strength, such as in balancing and walking. Since conducting numerous living activities on the floor is a Japanese custom, which is different from Western life-styles, observation of not only physical function related to falling but also activities and motions specific to elderly Japanese is necessary. Thus, we predicted that the ability to stand up from and sit on the floor affects activity restriction associated with fear of falling.

To investigate factors associated with fear of falling in elderly Japanese, the degrees of execution of activities and motions specific to elderly Japanese were added to the investigation items, and factors associated with fear of falling were extracted in Study I. In Study II, the physical function factors reported to be associated with fear of falling and factors affecting activities restricted by fear of falling were clarified.

Study I

Objective

The objective of this study was to extract factors associated with fear of falling and activities and motions of elderly persons.

Table 1. Main diagnoses of participants

Hypertension	18 (58%)
Osteoporosis	9 (29%)
Knee joint pain	9 (29%)
Cataract	6 (19%)
Fracture	5 (16%)
Stroke	3 (10%)
Others	6 (19%)

Participants

The participants were 31 elderly persons living in the community (7 males and 24 females) who gave informed consent. The mean age was 75.7±8.3 years (60–91 years). All participants showed independent outdoor mobility, and had no apparent motor disturbance nor dementia symptoms (Table 1). This study was approved by the ethics committee of Kanazawa University (No.43).

Methods

The survey was performed by the interview method. The survey items were: fear of falling, restriction of leaving the home due to fear of falling, experience of stumbling over the past one year, history of falling over the past one year, and activity self-efficacy. The presence or absence of fear of falling was surveyed by yes or no responses to the question: 'Are you fearful of falling?'. Regarding the restriction of leaving the home due to fear of falling, experience of having almost stumbled, and history of falling over the past one year, the participants gave answers simply as present or absent. As questions on activity self-efficacy, the questions of Modified Falls Efficacy Scale (MFES)[18)], Activities-specific Balance Confidence (ABC)[19)] and Survey of activities and fear of falling in the elderly (SAFE)[13)] used for the measurement of fear of falling were referred, and items regarding activities and motions specific to elderly Japanese, such as 'wiping the floor', were added (Table 2). The participants responded to the question, 'Do you have confidence to do it without falling?', by choosing a number from '1: no

Table 2. Activity self-efficacy items

	Items
1	Get dressed and undressed
2	Get in/out of bed or bedding on a tatami mat
3	Sit down/stand up from a tatami mat
4	Use toilet independently
5	Take a shower
6	Take a bath
7	Walk around inside the house
8	Go up and down stairs
9	Simple cleaning
10	Wiping the floor or tatami mat clean
11	Prepare a simple meal
12	Simple shopping
13	Light housekeeping
14	Answer door or telephone
15	Reach into cabinets or closets
16	Reach at eye level
17	Pick up slippers from floor
18	Reach on tiptoes
19	Stand on chair to reach
20	Walk around house
21	Walk outside to nearby car
22	Get in/out of car
23	Walk across the road
24	Go up and down ramps
25	Walk across a parking lot
26	Take public transportation
27	Walk in a crowded mall
28	Take an escalator holding the rail
29	Take an escalator not holding the rail
30	Walk on icy sidewalks
31	Go to the store
32	Visit a friend or relative
33	Go out to a movie or show
34	Go to a community activity
35	Go to a doctor or dentist
36	Put up an umbrella and walk
37	Put up an umbrella and go shopping
38	Walk on snow
39	Snow removal from around the house
40	Snow removal from the roof

confidence' to '10: very confident' (the Likert scale), as previously reported[10].

Statistic analysis

On analysis, the Fisher's exact-test and unpaired t-test were used for comparison of rates and means between the groups with and without fear of falling, respectively. For comparison without using means, the Mann-Whitney test was performed. Statistical analysis software, SPSS15.0J, was used, and a p level lower than 5% was regarded as significant.

Results

Twenty-one participants (67.8%) had fear of falling (fearful group) and 10 (32.2%) did not (non-fearful group). There were no significant differences between the fearful and non-fearful groups in age, gender, family members, experience of falling over the past one year, and use of a movement-assisting device (Table 3).

Items with significant differences in activity self-efficacy between the fearful and non-fearful groups were going up and down stairs ($p<0.01$), floor wiping ($p<0.05$), and immediate answering of the telephone ($p<0.05$) (Table 4).

Discussion

The objective of this study was to investigate the association of fear of falling with activities in community-living elderly. The presence/absence of fear of falling, various activities, and activity self-efficacy were investigated in community-living elderly with independent outdoor mobility. Of the

Table 3. Characteristics of participants

		Fearful (n=21)	Non-fearful (n=10)	p value
Age (years)*	Mean	74.2	78.7	0.16
	SD	9.1	5.5	
Sex**	Male	4 (19.1%)	3 (30%)	0.65
	Female	17 (80.9%)	7 (70%)	
Living situation**	Alone/An old couple	5 (23.8%)	4 (40%)	0.42
	With others	16 (76.2%)	6 (60%)	
Falls in previous year**		6 (28.6%)	1 (10%)	0.38
Stumble/Trip in previous year**		15 (71.4%)	5 (50%)	0.42
Assistive device	Cane	0 (0%)	1 (10%)	−

*t-test, **Fisher's exact-test

Table 4. Comparison of activity self-efficacy items with and without fear of falling

Items	p value
Go up and down stairs	0.009
Wiping the floor or tatami mat clean	0.028
Answer door or telephone	0.039

Mann-Whitney U-test

participants, 22.6% experienced falling over the past one year, similarly to the incidence of falling in Japanese community-living elderly in previous studies. In contrast, 67.8% of the participants had fear of falling, which was slightly higher than that in previous studies performed in Japan and other countries[10)11)]. Participants who refrained from leaving the home because of fear of falling accounted for 9.7%, which was lower than that reported by Howland et al.[6)]. It was suggested that the participants had fear of falling, but activity was less affected.

No item was correlated with those showing differences between the fearful and non-fearful groups, nor was there any item associated with falling experience. These findings were similar to observations in previous studies[5)7)]. Experience of falling was not associated with fear of falling in the community-living elderly with independent outdoor mobility, confirming that fear of falling is an independent factor in the elderly.

We attempted to measure activity self-efficacy, referring to the indices with established scales. Hotchkiss et al.[20)] compared the 3 scales referred to by us, FES, ABC, and SAFE, and found that the combined use of multiple scales makes investigation of the influence of fear of falling on activities easier. We combined items of these indices, and measured self-efficacy. Three activity items were associated with the fearful group: 'going up and down stairs', 'wiping the floor', and 'immediate answering of the telephone'. A significantly stronger fear of falling in community-living elderly with reduced time of standing on one foot with the eyes open[21)] and functional reach[17)] has been reported. These physical items evaluate balance in the static standing condition. The associated activity items were vertical movement of the center of gravity, such as raising the center of gravity from the floor to a higher level and lowering it from the standing position. These are common to the Japanese life-style, reflecting changes in posture due to Japanese multi-level housing and the use of tatami mats, and self-efficacy regarding posture changes from standing to a site close to the floor may be associated. Our survey included several activity items which required vertical movement of the center of gravity, but activities other than 'Wiping the floor or tatami mat clean', such as 'sit down/stand up from a tatami mat' 'pick up slippers from the floor', were not associated with the fearful group. The fact that we did not define the method of carrying out the activity, may have caused the incoherence in the patient's estimate of activity self-efficiency. For example, the fact that the participants have the habit of holding onto the table when standing up from the floor, or, that they do not have opportunities to pick up slippers from the floor, may have caused the differences in their answers regarding self-efficiency. This may be the reason why only the activity of 'wiping the floor', which can be imagined that the patients often have difficulty performing in their daily lives, was associated with the fearful group. We need to further improve the method of survey to get coherent responses regarding the ability to perform activities. Since measurement of these movements using the previous indices for physical strength evaluation is difficult, investigation of vertical downward reactivity toward the floor is necessary. Immediate answering of the phone is a complex activity, and identification of its association is difficult, but it is related to agility. Fuzhong et al. reported the association of walking speed[17)], but such intentional behavior is not limited to walking on level ground. This is one activity to change the posture required for rapid response, environments, and activity initiation.

These findings suggested the association of vertical movement and agility with fear of falling, and that the prediction of these using the previously reported evaluation indices of physical function is difficult.

Study II

Objective

The objective of this study was to clarify the structure of factors affecting activities restricted by fear of falling via measuring the speed of reactions of physical functional factors reported to be associated with fear of falling and activities and motion suggested by Study I.

Participants

The participants were 54 community-living elderly persons (10 males and 44 females) aged 73.8±7.8 years (mean±SD; range: 65–91 years). All participants showed independent outdoor mobility, and had no apparent motor disturbance nor dementia symptoms (Tables 5 and 6). This study was approved by the ethics committee of Kanazawa University (No.43).

Table 5. Demographics of subjects

Age (years)	
Mean	73.8
SD	7.8
Range	65–91
Sex	
Male	10 (19%)
Female	44 (82%)
Living situation	
Alone	5 (9%)
An old couple	18 (33%)
With others	31 (58%)
Assistive device	
None	38 (70%)
Cane	16 (30%)
MSQ*	
Median (Range)	10 (8–10)

*MSQ: Mental status questionnaire

Table 6. Characteristics of participants' main diagnoses

Knee joint pain	35 (65%)
Lower back pain	28 (52%)
Hypertension	27 (50%)
Osteoporosis	17 (31%)
Cataract	15 (28%)
Hip joint pain	11 (20%)
Dizziness	8 (15%)
Stroke	5 (9%)
RA	1 (2%)
Others	4 (8%)

Methods

Fear of falling, restriction of leaving the home due to fear of falling, experience of falling over the past one year, history of falling over the past one year, self-rated health, and activity self-efficacy were surveyed. Regarding fear of falling, the participants were asked, 'are you fearful of falling?', and chose the answer from '1: very fearful', '2: slightly', and '3: no'. Regarding restriction of leaving the home due to fear of falling, experience of having almost stumbled, and history of falling over the past one year, the participants gave answers simply as present or absent. As for self-rated health, the participants chose '1: very healthy', '2: fairly healthy', '3: not very healthy', or '4: not healthy'. Concerning questions on activity self-efficacy, the participants were interviewed as to whether they were '1. not confident, '2. slightly lacking confidence', '3. fairly confident', or '4. very confident'. The movements measured were timed up and go test (TUG), times required for standing up from the floor, sitting on the floor, and going up and down a step, as well as forward, lateral, and downward movement times of the upper limbs in the standing position. In TUG, the participants stood up from an armchair, walked for 3 m, turned around, walked back, and sat again on the chair, and the time required for this movement was measured[23]. As for the time required for standing up from the floor, that required for standing up from the long sitting position to straight standing without holding onto any support was measured. Regarding the time required for sitting on the floor, that required to sit in the long sitting position from the straight standing position was measured. Concerning the time required for going up and down a step, that required to go up and down a 15-cm step without support one time was measured. In the measurement of forward, lateral, and downward movement times of the upper limbs in the standing position, an A/D converter (PC CARD, CONTEC) was connected to a PC (Panasonic), and the time required to turn a lamp from on to off was measured. The lamp was placed 50-cm anterior to the subject at a 80-cm level (Fig. 1). The examiner manually lit the lamp,

and the subject turned it off in the straight standing position. The subject turned off the switch with both hands in the forward, lateral, and downward directions. For the forward and lateral directions, the switch was placed at the subject's left acromial level, and the initial limb position was set at a 45° flexion of the elbow joint (Figs. 2 A and B)[24]. For the downward direction, the switch was placed at the subject's patellar level (Fig. 2 C).

Statistic analysis

Association between the total score of activity self-efficacy and the items was investigated by Spearman's rank correlation analysis. In addition, multiple regression analysis regarding activity self-efficacy as a dependent variable and the correlated factors as explanatory variables was performed by the stepwise method. Statistical analysis software, JMP 6.0.3, was used, and a p level lower than 5% was regarded as significant.

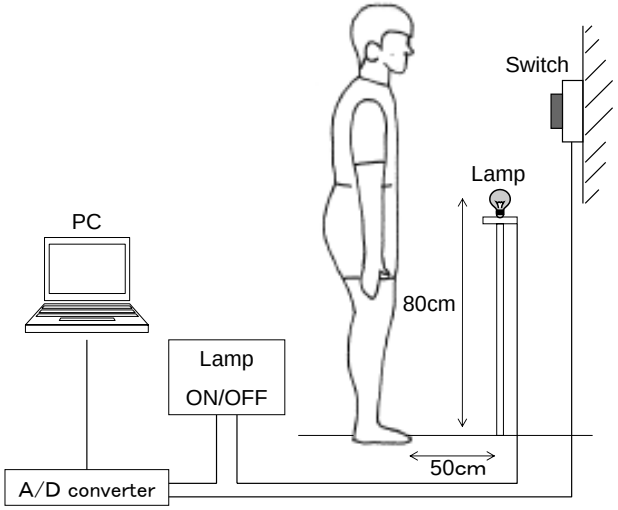
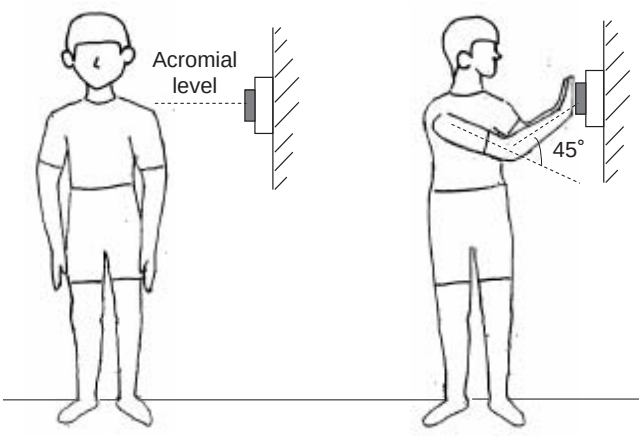


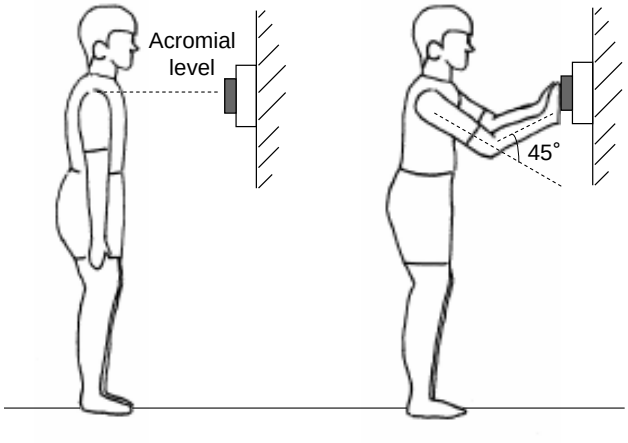
Figure 1. Measuring machine device of movement time

An A/D converter was connected to a PC, and the time required to turn a lamp from on to off was measured. The lamp was placed 50-cm anterior to the subject at a 80-cm level.



B) Movement time for lateral

The switch was placed at the subject's left acromial level. The distance to the subject was adjusted so as to set the initial limb position to 45° flexion of the bilateral cubital joints.



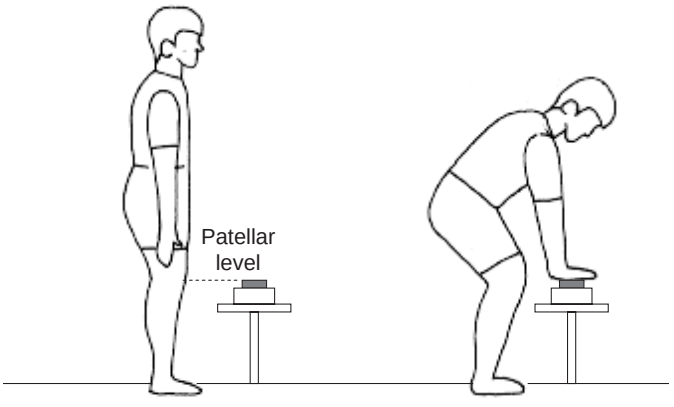


Figure 2. Measurement of movement times of the upper limbs in the standing position

A) Movement time for forward

The switch was placed at the subject's acromial level and middle of the trunk width. The distance to the subject was adjusted so as to set the initial limb position to 45° flexion of the bilateral cubital joints.

C) Movement time for downward

The switch was placed at the subject's patellar level and middle of the trunk width.

Results

Eighteen and 27 of the 54 participants (28% and 50%, respectively) answered that they were very and slightly fearful of falling, respectively, and 16 participants (30%) refrained from leaving the home due to fear of falling (Table 7).

A significant correlation was noted between activity self-efficacy and fear of falling (r_s=0.417, $p<0.01$). As for physical function items, the lateral (r_s=−0.316, $p<0.05$) and downward (r_s=−0.302, $p<0.05$) movement times, TUG (r_s=−0.351, $p<0.01$), times required for going up and down a step (r_s=−0.372, $p<0.01$), standing up from the floor (r_s=−0.334, $p<0.05$), and sitting down on the floor (r_s=−0.369, $p<0.01$), as well as self-rated health (r_s=0.295, $p<0.05$) were significantly correlated (Table 8).

Table 9 shows the results of multiple regression analysis by the stepwise method. The downward movement time (β=−0.257, $p<0.05$) and TUG (β=−0.345, $p<0.01$) were extracted as factors affecting the total score of activity self-efficacy. No influence of multiple linearity between the factors was detected on analysis of variance of all regression coefficients ($p<0.01$) or the variance inflation factor (VIF=1.02), confirming the goodness of fit of the multiple regression equation. The proportion was 21% (R^2=0.21).

Table 7. Characteristics of participants

Falls in previous year	15 (28%)
Stumble/Trip in previous year	34 (63%)
Fear of falling	
Very fearful	18 (33%)
Moderately fearful	27 (50%)
Non-fearful	9 (17%)
Fear and activity restriction	16 (30%)
Self-rated health	
Excellent	7 (13%)
Good	16 (30%)
Fair	28 (52%)
Poor	3 (6%)

Discussion

For elderly persons, falling is a serious problem because it has a psychological influence, such as activity restriction due to fear of falling, in addition to the reduction of physical function by fracture. The objective of this study was to clarify the structure of factors affecting activities restricted by fear of falling via measuring the speed of reactions of physical functional factors reported to be associated with fear of falling and activities and motion suggested by Study I.

Table 8. Correlation analysis of activity self-efficacy scale and items

	1	2	3	4	5	6	7	8
1 Activity self-efficacy scale (points)								
2 Movement time for forward (sec.)	−0.187							
3 Movement time for lateral (sec.)	−0.316*	0.731**						
4 Movement time for downward (sec.)	−0.302*	0.766**	0.580**					
5 Timed up and go test (sec.)	−0.381**	0.162	0.280*	0.132				
6 Going up and down a 15-cm step (sec.)	−0.372**	0.168	0.238	0.176	0.881**			
7 Sitting on the floor (sec.)	−0.369**	0.012	0.253	0.01	0.825**	0.811**		
8 Standing up from the floor (sec.)	−0.334*	0.09	0.151	0.081	0.809**	0.683**	0.597**	
9 Self-rated health (scale)	0.295*	−0.06	−0.163	0.032	−0.451**	−0.346*	−0.286*	−0.409**

*$p<0.05$ **$p<0.01$

Table 9. Relationship of activity self-efficacy scale and measurement parameters

	Partial regression coefficient	Standardization partial regression coefficient	p value	VIF
Intercept	173.13			
Movement time for downward	−41.83	−0.257	0.046	1.017
Timed up and go test	−1.61	−0.345	0.008	1.017

Multiple regression analysis by stepwise method
R^2=0.21, p=0.0026
Y=173.13 + −41.83 × (Movement time for downward) + −1.61 × (TUG)

The activity self-efficacy investigated was significantly correlated with fear of falling, showing that it reflects the fear level. On physical function measurement, the time required for going up and down a 15-cm step, downward movement time of the upper limbs, and times required for standing up from and sitting on the floor were correlated with self-efficacy, showing an association with vertical motion required for the traditional Japanese life-style. Multiple regression analysis detected an association with the vertical downward movement time of the upper limbs and TUG, vertical downward motion reactivity from the standing position affects activities and motion restricted by fear of falling. TUG is an agile movement performed from sitting on a chair, reflecting a complex motion shown to have an association in Study I.

Many studies in community-living elderly have reported an association of fear of falling with a reduction in motor function, such as lower limb muscle strength, balance, and walking speed[17)21)22)25)]. Binda et al.[26)] reported that fear of falling was more strongly associated with balance than muscle strength, and the ability to move the center of gravity forward and laterally is particularly important for balance. Robinovitch et al. compared the forward and lateral movement times between elderly and young persons, and found that the time required to move and touch a wall with the hands in response to a signal was significantly longer in the elderly[24)]. We measured the vertical downward movement time in addition to the experiments reported by Robinovitch et al, since conducting numerous living activities on the floor is a Japanese custom, such as a Japanese style restroom or the tatami mat as a result of study I and confirmed that vertical downward movement of the center of gravity affected fear of falling. Although there has been no previous study in community-living elderly Japanese that showed an association with floor-related movements and vertical downward reactivity, elderly persons may change from a Japanese life-style to a western life-style when they become anxious for their personal safety. They inevitably change the life-style when these movement and reactivity levels decrease, reducing the QOL. To perform normal daily activities with confidence, it is necessary to take measures to prevent the reduction of floor-related movements and vertical downward reactivity.

The regaining of confidence increases independence in daily activities in persons with fear of falling. To overcome an excessive fear of falling, improvement of physical skills to increase self-efficacy against falling is effective[8)]. Reduction of fear of falling by balance training in elderly persons has been reported[27)-29)]. On the other hand, a study on in-patients shows that the fear of falling prevents the patients from falling. Thus, the fear of falling does not necessarily have negative effect on the elderly[10)]. However, for the elderly living in the community, it is likely to decrease their activity, and reduces their QOL[14)]. The increase in vertical downward reactivity revealed by this study, in addition to improvement of physical skills, may strengthen the ability to avoid falling, resulting in increasing activity self-efficacy. The possibility of preparing a program to increase defensive vertical downward reactivity for the prevention and improvement of fear of falling was shown.

Conclusion

Activity self-efficacy was associated with TUG and the vertical downward movement time of the upper limbs from the standing position. These are essential maneuvers for sitting on the floor customary to the Japanese life-style. Preventing a reduction of vertical downward motion ability while standing may lead to the prevention and improvement of fear of falling, and its application in evaluation and intervention programs is expected.

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References

1) Tinetti ME, Powell L: Fear of falling and low self-efficacy: a case of dependence in elderly persons. J Gerontol 48: 35-38, 1993
2) Cumming RG, Salkeld G, Thomas M, et al: Prospective study of the impact of fear of falling on activities of daily living, SF-36 scores, and nursing home admission. J Gerontol A Biol Sci Med Sci 55: M299-305, 2000
3) Friedman SM, Munoz B, West SK, et al: Falls and fear of falling: which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. J Am Geriatr Soc 50: 1329-1335, 2002
4) Silverton R, Tideiksaar R: "Psychosocial aspects of falls: Its prevention and treatment", Springer, New York, pp 87-110, 1989
5) Arfken CL, Lach HW, Birge SJ, et al: The prevalence and correlates of fear of falling in elderly persons living in the community. Am J Public Health 84: 565-570, 1994
6) Howland J, Peterson EW, Levin WC, et al: Fear of falling among the community-dwelling elderly. J Aging Health 5: 229-243, 1993
7) Howland J, Lachman ME, Peterson EW, et al: Covariates of fear of falling and associated activity curtailment. Gerontologist 38: 549-555, 1998
8) Tinetti ME, Mendes de Leon CF, Doucette JT, et al: Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. J Gerontol 49: M140-147, 1994
9) Walker JE, Howland J: Falls and fear of falling among elderly persons living in the community: occupational therapy interventions. Am J Occup Ther 45: 119-122, 1991
10) Kondo S, Miyamae T, Ishibashi Y, Tsutsumi F: Fear of falling among elderly person. Sogo Rehabilitation 27: 775-780, 1999 (in Japanese)
11) Suzuki M, Kanamori M, Yamada K: Incidence of, and factors related to, the fear of falling among the elderly living in their own homes. Jpn J Geriatric Psychiatry 10: 685-695, 1999 (in Japanese)
12) Murphy SL, Williams CS, Gill TM: Characteristics associated with fear of falling and activity restriction in community-living older persons. J Am Geriatr Soc 50: 516-520, 2002
13) Lachman ME, Howland J, Tennstedt S ,et al: Fear of falling and activity restriction: The Survey of activities and fear of falling in the elderly (SAFE). J Gerontol B Psychol Sci Soc Sci 53: 43-50, 1998
14) Yardley L, Smith H: A prospective study of the relationship between feared consequences of falling and avoidance of activity in community-living older people. Gerontologist 42: 17-23, 2002
15) Bandura A: Self-efficacy mechanism in human agency. Am Psychol 37: 122-147, 1982
16) Tinetti ME, Richman D, Powell L, et al: Falls efficacy as a measure of fear of falling. J Gerontol 45: 239-243, 1990
17) Fuzhong L, McAuley E, Fisher KJ, et al: Self-efficacy as a mediator between fear of falling and functional ability in the elderly. J Aging Health 14: 452-466, 2002
18) Hill KD, Schwarz JA, Kalogeropoulos AJ, Gibson S: Fear of falling revisited. Arch Phys Med Rehabil 77: 1025-1029, 1996
19) Powell LE, Myers AM: The Activities-specific Balance Confidence(ABC)Scale. J Gerontl Med Sci 50: M28-34, 1995
20) Hotchkiss A, Fisher A, Robertson R, et al: Convergent and predictive validity of three scales related to falls in the elderly. Am J Occup Ther 58: 100-103, 2004
21) Maki BE, Holliday PJ, Topper AK: Fear of falling and postural performance in the elderly. J Gerontol 46: M123-131, 1991
22) Lawrence RH, Tennstedt SL, Kasten LE, et al: Intensity and correlates of fear of falling and hurting oneself in the next year: baseline findings from a Roybal Center fear of falling intervention. J Aging Health 10: 267-286, 1998
23) Podsiadlo D, Richardson S: The timed "Up & Go": a test of basic functional mobility for frail elderly persons. J Am Geriatr Soc 39: 142-148, 1991
24) Robinovitch SN, Normandin SC, Stotz P, Maurer JD: Time requirement for young and elderly women to move into a position for breaking a fall with outstretched hands. J Gerontol A Biol Sci Med Sci 60: 1553-1557, 2005
25) Kim H, Yoshida H, Suzuki T, et al: The Relationship between Fall-related activity restriction and functional fitness in elderly women. Jpn J Geriat 38: 805-811, 2001 (in Japanese)
26) Binda SM, Culham EG, Brouwer B: Balance, muscle strength, and fear of falling in older adults. Exp Aging Res 29: 205-219, 2003
27) Taggart HM: Effects of Tai Chi exercise on balance, functional mobility, and fear of falling among older women. Appl Nurs Res 15: 235-242, 2002
28) Wolf SL, Barnhart HX, Kutner NG, et al: Reducing frailty and falls in older persons: an investigation of Tai Chi and computerized balance training. Atlanta FICSIT Group. Frailty and Injuries: Cooperative Studies of Intervention Techniques. J Am Geriatr Soc 44: 489-497, 1996
29) Yates SM, Dunnagan TA: Evaluating the effectiveness of a home-based fall risk reduction program for rural community-dwelling older adults. J Gerontol A Biol Sci Med Sci 56: M226-230, 2001

地域高齢者の転倒恐怖感による活動制限に影響を及ぼす要因

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要　　旨

高齢者が転倒恐怖感を持つことは、日常生活における活動制限や行動範囲の縮小を引き起こし、身体機能低下や生活の質（QOL）の低下を招くとされている。日本では床上動作の習慣があることから垂直上下方向への動作の影響性に着目し、転倒恐怖感に影響を与えている因子構造を明らかにすることを目的とした。対象は屋外移動が自立している地域高齢者とした。転倒恐怖感の程度は活動遂行における自己効力感を評価した。研究Ⅰでは、地域高齢者31名（平均年齢75.7±8.3歳）の対象を転倒恐怖感あり群と転倒恐怖感なし群の２群に分けて、40活動項目の各自己効力感を比較した結果、階段昇降、床の拭き掃除、電話対応の活動遂行の自己効力感が転倒恐怖あり群の方がなし群よりも有意に低かった。研究Ⅱでは地域高齢者54名（平均年齢73.8±7.8歳）を対象に、研究Ⅰで関連が認められた活動要素を客観的指標で検証した。活動遂行の自己効力感と相関のあった因子は、Timed up and Go Test（TUG）、床からの立ち上がり時間、床への座り時間、15cm段差昇降時間、側方上肢動作時間、下方上肢動作時間、健康度自己評価であった。活動遂行の自己効力感を目的変数、相関のあった因子を説明変数とした重回帰分析（ステップワイズ法）の結果から、転倒恐怖感に影響を与える因子として、下方上肢動作時間、TUGの2因子が確認できた。これらのことから転倒恐怖感の評価や介入では移動能力に加え、立位での垂直下方向に対する上肢反応を考慮する必要性が示唆された。