# Relation between Falls Efficacy Scale (FES) and quality of life in nursing home residents in Japan

（施設入所高齢者の Quality of Life に対する
転倒自己効力感尺度（Falls Efficacy Scale : FES）の関連）

名古屋大学大学院医学系研究科
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理学療法学分野
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## INTRODUCTION

Falls and fractures are the third leading cause of the need for care in Japan, and this trend is particularly marked in elderly women.[1)] Falls and fractures tend to turn "mobile" elderly into "immobile" elderly, and while their impact can significantly change quality of life (QOL), that impact is not limited to the direct physical trauma; there are also long-term psychological effects, such as fear of falling and depression.[2,3)] Fear of falling in the elderly also leads to a downward spiral of decreased activity, accelerated deterioration of physical functioning, and a narrower range of activity,[2,4)] and QOL will also be affected.[3,5,6)]

Fear of falling was defined by Tinetti *et al*.[7)] as a level of anxiety associated with falls sufficient to prompt people to avoid certain activities of daily living even though they are capable of performing them. There are two methods of measuring fear of falling: asking people directly about their fear, and the use of falls self-efficacy. The latter is represented by the Falls Efficacy Scale (FES),[8)] which is a method of assessment that was developed based on the self-efficacy theory proposed by Bandura.[9)] Although the method of asking directly about fear of falling is a simple one, neither its reliability nor validity have been sufficiently established. On the other hand, FES has proved to be both reliable and valid.[10)] There have been studies on the relation between FES and QOL in the community-dwelling elderly.[5,6)] Falls tend to occur more often among elderly people in Japan living in nursing homes (10–40%) than among those still residing in their own community (10–20%).[11)] Among the nursing home elderly who experience many falls,[11)] the falls self-efficacy is lower, and QOL will predictably be further diminished.

Since improving QOL is the ultimate goal for nursing home elderly many of whom suffer from chronic disease, analysis of falls self-efficacy which threatens QOL is an

important problem. However, there are few reports on FES in nursing home elderly,[8] because of deteriorated cognitive function and physical infirmity. In Japan there are only reports on the relation with motor functions[12]; to our knowledge there are no reported investigations of the relation with QOL. The FES is based on both physical ability and mental confidence (self-efficacy).[6,8] FES interventions among the community-dwelling elderly are reportedly effective in the area of motor ability, particularly that which focuses on balance,[13] but is more difficult to improve physical function in elderly people and chronic disease patients in care facilities. We hypothesized that the relation of FES to QOL is strong among nursing home elderly in the high fall risk group, and that raising FES by paying attention not only to physical ability but mental confidence would contribute to improving QOL. Therefore, as a first step toward improving QOL through interventions for FES among such elderly, we have investigated the relation between FES and QOL in nursing home elderly.

## METHODS

*Subjects*

The subjects for this study were 133 female nursing home elderly with comparatively intact cognitive function, who had a Mini-Mental State Examination (MMSE) score of 15 or more, and could complete the questionnaire survey. All subjects were participants in a broader clinical trial of hip protectors in nursing homes in Aichi Prefecture, Japan. Inclusion criteria for the clinical trial were: female sex, 70 or more years of age, not bedridden, and with at least 1 risk factor for falls or a hip fracture.[14] Those risk factors were: a history of hip fracture, history of fall(s) in the past year, and complicating conditions that predispose an elderly person to falls or fractures, i.e., heart disease, hypertension, previous stroke, diabetes mellitus,

parkinsonism, arrhythmia, epileptic seizure, osteoarthritis, rheumatoid arthritis or a related condition, and eye disease (cataract or glaucoma).

*Cross-sectional evaluation items*

This cross-sectional analysis was conducted from November 2004 to November 2005. The cross-sectional evaluation items were age, height, weight, body-mass index (BMI), history of hip fracture, history of fall(s) in the past year, complicating conditions, MMSE,[15] Medical Outcomes Study 8-Item Short-Form Health Survey (SF-8),[16] FES,[8] and motor items on the Functional Independence Measure (FIM).[17]

*SF-8*—QOL was assessed in an interview using the Japanese version of the SF-8,[16] which is a shorter version of the SF-36 and is used as a comprehensive and multidisciplinary measure of health status. The Physical Component Summary (PCS) and Mental Component Summary (MCS) were calculated using eight subscales: physical functioning (PF), role physical (RP), bodily pain (BP), general health perception (GH), vitality (VT), social functioning (SF), role emotional (RE), and mental health (MH). It was reported that PF, RP, BP and GH showed a strong relation to PCS, and that SF, RE, and MH evidenced a strong relation to MCS. As for VT, it shows a medium relation to both PCS and MCS. The reliability of the eight subscales of the Japanese version of the SF-8 is reportedly 0.56–0.87, while that of PCS is 0.77 and that of MCS 0.73.[16]

*Falls Efficacy Scale (FES)*—The FES was designed to assess the degree of perceived efficacy at avoiding a fall during each of 10 relatively non-hazardous activities of daily living (Taking a bath or shower, Reaching into cabinets or closets, Preparing meals that do not require carrying heavy or hot objects, Walking around the house, Getting in and out of bed, Answering the door or telephone, Getting in and out

of a chair, Getting dressed and undressed, Light housekeeping, and Simple shopping).[8] Each response was scored on a scale of 1 (completely confident) to 10 (no confidence), with a high score (possible total point range 10–100) indicating low falls self-efficacy. The internal consistency was reported to be 0.90 (Cronbach's α),[18] and the test-retest reliability 0.71 (Pearson's correlation coefficient).[8] However, since the present study was conducted with nursing home residents as subjects, the items used were arranged to correspond to ADL in a nursing home setting: walking around the house was equated with the participant walking in the vicinity of the bed, light housekeeping with cleaning around the bed, and simple shopping as at stores or stands on the nursing home premises (Table 1).

*FIM motor items*—ADL was evaluated using FIM motor items[17] comprised of 6 self care activities (eating, grooming, bathing, dressing (upper body), dressing (lower body), toileting), 2 sphincter control items (bladder management, bowel management), 3 transfer items (transfers to bed/chair/wheelchair, to toilet, and to tub or shower), and 2 locomotion items (ambulation, stairs). Four subscores (self care, sphincter control, transfer, locomotion) were calculated. Each item was graded from fully assisted (1 point) to completely independent (7 points). In the present study, only ambulation was judged, although ambulation or wheelchair movement indoors was judged in the original method.[17]

*Analytic procedure*

We arranged the items of the original FES[8] to correspond to ADL in a nursing home setting. Therefore, we retested nine participants (mean age 85.2 years) after 2 weeks, and confirmed the internal consistency (Cronbach's α) or test-retest reliability (Pearson's correlation coefficient).

Dependent variables were PCS, MCS, and the subscales. First, we examined the correlation between dependent variables and other variables [FES, age, BMI, history of hip fracture, history of fall(s) in the past year, total number of complicating conditions, MMSE, and the subscores for FIM motor items (self care, sphincter control, transfer, and locomotion)] using Spearman's rank correlation coefficient (rho).

Next, after adding significant variables to the correlation analysis and age to the multiple regression analysis (method of all possible combinations) with FES as explanatory variables, we calculated the standardized partial regression coefficient (β) to investigate the strength of the relation between FES and QOL. Since the age was a variable which may relate to all variables, even though the significant correlation between age and dependent variables were not found, age was added to the explanatory variables. Moreover, regression analysis was done after confirming no multicollinearity between explanatory variables. As a secondary analysis, to determine the influence of past falls on QOL, a similar multiple regression analysis was conducted with PCS and MCS as dependent variables for two groups, one with falls in the past year (60 subjects) and one without falls in the past year (73 subjects).

In the present study, the SPSS 14.0 program was used for all statistical analyses, with less than 0.05 as the level of significance.

*Ethical considerations*

All participants gave written informed consent, and their names were coded from the start of the study through data collection and analysis so that no single individual could be identified. This study was approved by the Ethics Committees of both the Nagoya University School of Health Sciences and the National Center for Geriatrics and Gerontology.

## RESULTS

Informed consent to participate in the hip protector clinical trial was obtained from 342 women in 35 nursing homes. However, 7 later refused to participate, 12 left the nursing home in which they were living before the cross-sectional evaluation, 135 had MMSE scores of 15 or less, and 55 could not complete the questionnaire survey. The present study was therefore conducted with the remaining 133 subjects.

The Cronbach's α or Pearson's correlation coefficient with which we arranged the items of the original FES[8] to correspond to ADL in a nursing home setting, was 0.91 or 0.72 ($P$ = 0.03).

The attributes of all 133 subjects were shown in Table 2 and 3. As for the results of correlation analysis, PCS showed significant correlations with FES, the total number of complicating conditions, MMSE, the subscore of transfer, and locomotion. Moreover, all SF-8 subscales and FES were significantly correlated, and MH was significantly correlated with BMI (Table 4).

Table 5 shows the results of multiple regression analysis. PCS and FES showed a significant relation, while MCS did not. In each subscale, all subscales and FES showed significant relations; these were especially close between PF and RP. Those relations were higher than those for the transfer and locomotion subscores. As to a secondary analysis, the relation of FES to PCS in the group that had fallen in the past year was slightly lower than in the group that had not done so (β of fall group= -0.35 vs. β of no-fall group= -0.38).

## DISCUSSION

In the present study, the relation between FES and QOL in nursing home female

elderly with a comparatively intact cognitive function has investigated. We arranged the items of the original FES[8] to correspond to ADL in a nursing home setting, then used it after confirming the internal consistency or test-retest reliability were equivalent to the original FES[8]. Many elderly nursing home residents suffer diminished cognitive function, so it can be difficult to select participants for surveys using questionnaires. Our subjects were women who scored 15 or higher on MMSE, since it was reported that "for patients with MMSE of 15, test-retest coefficients were better (range 0.53–0.90)" in the SF-36.[19]

Of the total 133 subjects, 45.1% had experienced a fall within the past year. A high-risk group with such a high incidence of falling is predicted to have a lower falls self-efficacy than elderly people living at home. The mean FES of nursing home elderly was 45.0 ± 22.3, against the 18.56 ± 9.04 of those reported still residing in the community or in intermediate care facilities.[8] That result was in line with our prediction that the falls self-efficacy of the nursing home elderly would be lower than that for those still residing in a community.

Among the community-dwelling elderly, FES showed a significant relation to PCS,[6] with PF showing an especially high correlation in each subscale, followed by SF, BP, VT, and RP.[5] This study suggested that among the nursing home elderly, similar to the community-dwelling elderly, FES was significantly related to PCS, and that among the subscales the relation was especially close with PF and RP.

The relation of FES to PF and RP, as items related to physical QOL, was higher than the relations of the transfer or locomotion subscores. It was previously reported that there is a strong relation between PF and transfer or locomotion ability.[20] So, in people such as the nursing home elderly whose physical ability had clearly deteriorated, it was predicted that the transfer or locomotion subscores might be more closely

related to PF and RP rather than FES. Interestingly, the relation of FES to PF and RP was higher than the relations of either transfer or locomotion subscores.

The FES is based on both physical ability and mental confidence (self-efficacy),[6,8] with the latter being affected by four main information sources. This information influences mental confidence based on an individual's interpretation.[9] Since some type of care is needed in daily life for many nursing home residents, mental confidence tends to be readily influenced by the safer environment (the use of handrails, etc) or the way a resident experiences that care. It is reported that interventions for FES are effective among the community-dwelling elderly in the area of motor ability, particularly that which focuses on balance.[13] While it is important to attempt to raise FES by improving physical function, it becomes more difficult to improve physical function in elderly people and chronic disease patients in care facilities. Therefore, for elderly care facility residents in particular, (a group with a high risk for falls including many people who require some type of care in daily life), considering mental confidence is important for physical QOL. We suggested that FES, including not only physical activity per se but also mental confidence, should be given prominence in the physical QOL of the nursing home elderly. Although causal relationships could not be determined in this study since it was a cross-sectional analysis, we conjectured that raising FES, by paying attention not only to physical ability but also mental confidence, might contribute to improving physical QOL of the nursing home elderly.

In this study, as a secondary analysis, we conducted a similar multiple regression analysis with PCS and MCS for a group that had fallen in the past year and a group that had not. Friedman *et al.*[21] found that fear of falling is exacerbated by the experience of previous falls. It was predicted that the strength of the relation to PCS in the fall group would be greater than in the no-fall group. However, the relation of FES

to PCS in the fall group was slightly lower than in the no-fall group. Factors that have been suggested as related to fear of falling include the importance of life satisfaction[22] and decreased social activity.[6] FES may be influenced by various other factors in addition to the experience of falling. In the future, it will be necessary to investigate in detail the factors involved in FES.

Limitations of the present study include, first, the problem of sensitivity in evaluating QOL. In this study, SF-8, which can readily provide answers in a short time, was used to evaluate QOL. The correlation of the subscale score, which measures the same concept between SF-8 and SF-36, was as high as 0.56-0.87, thus supporting the reliability of SF-8.[16] Nevertheless, the accuracy of SF-8 measurements alone is undeniably inferior to that for SF-36. Next, there were also limits to FES evaluation of the nursing home elderly in our study. Our subjects did not need to "prepare meals that required carrying heavy or hot objects," which was one of the standard FES items; moreover, there were other items the nursing home elderly could not actually perform. They were also asked to respond to the question: "If you try, how confident are you in performing an act without falling?"[8] However, it is possible that some subjects not wishing to admit to a "fear of falling," instead addressed the "likelihood of falling." In addition, since being female was a criterion for participation in the hip protector clinical trial, men were not analyzed. Differences between the sexes have been reported in the distribution and factors related to fear of falling,[22] so the results of this study cannot be extrapolated to all nursing home residents.

In conclusion, FES was related to PCS, and that relation was particularly close to the PF and RP, which were related to physical QOL. The strength of that relation was higher than with the transfer or locomotion subscores. It becomes progressively more difficult to improve physical function in the nursing home elderly because of their

advanced age and chronic diseases. The results of the present study suggested that mental confidence is important for physical QOL, and FES including not only physical activity per se but also mental confidence should be given prominence in the physical QOL of the nursing home elderly. We expect that evidence of the effective interventions to raise FES and improve QOL among the nursing home elderly will be forthcoming in the not too distant future.

## ACKNOWLEDGMENTS

The authors wish to thank the women who participated in this study. We would also like to express our gratitude to the staff members of the 35 nursing homes where the trial was conducted for their generous cooperation.

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## REFERENCES


1) Ministry of Health, Labour and Welfare. Comprehensive Survey of Living Conditions of the People on Health and Welfare (2004). 2004, Tokyo.
2) Howland J, Peterson EW, Levin WC, Fried L, Pordon D, Bak S. Fear of falling among the community-dwelling elderly. *J Aging Health,* 1993; 5: 229-243.
3) Arfken CL, Lach HW, Birge SJ, Miller JP. The prevalence and correlates of fear of falling in elderly persons living in the community. *Am J Public Health,* 1994; 84: 565-570.
4) Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol,* 1994; 49: M140-M147.
5) Lachman ME, Howland J, Tennstedt S, Jette A, Assmann S, Peterson EW. 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,* 1998; 53: 43-50.
6) Cumming RG, Salkeld G, Thomas M, Szonyi G. 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,* 2000; 55: M299-M305.
7) Tinetti ME, Powell L. Fear of falling and low self-efficacy: a case of dependence in elderly persons. *J Gerontol,* 1993; 48: 35-38.
8) Tinetti ME, Richman D, Powell L. Falls efficacy as a measure of fear of falling. *J Gerontol,* 1990; 45: P239-P243.
9) Bandura A. Self-efficacy mechanism in human agency. *Am Psychol,* 1982; 37: 122-147.
10) Jorstad EC, Hauer K, Becker C, Lamb SE. Measuring the psychological outcomes of falling: a systematic review. *J Am Geriatr Soc,* 2005; 53: 501-510.

11) Yasumura S, Kanari Y. Epidemiology of falls and fractures among the elderly. *Bone,* 2003;17: 237-241.

12) Ikezoe T, Asakawa Y, Shima H, Tsuboyama T. Contributing factors influencing on fear of falling in frail elderly persons. *J Physical Medicine*, 2006; 17: 54-60.

13) Zijlstra GA, van Haastregt JC, van Rossum E, van Eijk JT, Yardley L, Kempen GI. Interventions to reduce fear of falling in community-living older people: a systematic review. *J Am Geriatr Soc,* 2007; 55: 603-615.

14) Kannus P, Parkkari J, Niemi S, Pasanen M, Palvanen M, Järvinen M, Vuori I. Prevention of hip fracture in elderly people with use of a hip protector. *N Engl J Med*, 2000; 343: 1506-1513.

15) Folstein MF, Folstein SE, McHugh PR. "MINI-MENTAL STATE" : a practical method for grading the cognitive state of patients for the clinician. *J Psychiatr Res,* 1975; 12: 189-198.

16) Fukuhara S, Suzukamo Y. Manual of the SF-8 Japanese version. pp.7-141, 2004, Institute for Health Outcomes & Process Evaluation Research, Kyoto.

17) Chino N, Liu M, Sonoda S, Domen K. Functional Evaluation of Stroke Patients. pp.43-95, 1997, Springer-Verlag, Tokyo.

18) Powell LE, Myers AM. The Activities-specific Balance Confidence (ABC) Scale. *J Gerontol A Biol Sci Med Sci, 1995;* 50A: M28-M34.

19) Novella JL, Jochum C, Ankri J, Morrone I, Jolly D, Blanchard F. Measuring general health status in dementia: practical and methodological issues in using the SF-36. *Aging (Milano),* 2001; 13: 362-369.

20) Kanegane S, Hayashi C, Konuma M, Yamashiro S, Saiba M, Jufukuin S, Kitagawa K. Health-related quality of life and preferences for medical services of institutionalized elderly people. *Jpn J Prim Care*, 2001; 24: 118-125.

21) Friedman SM, Munoz B, West SK, Rubin GS, Fried LP. Falls and fear of falling: Which comes first? A longitudinal prediction model suggests strategies for primary and secondary prevention. *J Am Geriatr Soc,* 2002; 50: 1329-1335.

22) 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 Geriatr Psychiatry*, 1999; 10: 685-695.

**Table 1** Falls Efficacy Scale (FES)

| Activities |
|---|
| 1. Taking a bath or shower |
| 2. Reaching into cabinets or closets |
| 3. Preparing meals that do not require carrying heavy or hot objects |
| 4. Walking around participant's bed |
| 5. Getting in and out of bed |
| 6. Answering the door or telephone |
| 7. Getting in and out of a chair |
| 8. Getting dressed and undressed |
| 9. Cleaning around participant's bed |
| 10. Shopping at stores or stands on nursing home premises |

We arranged the items of original FES[6] to correspond to ADL in a nursing home setting: walking around the house was equated with walking around the participant's bed, light housekeeping with cleaning around the participant's bed, and simple shopping as at stores or stands on the nursing home premises.

**Table 2** Attributes of all 133 subjects about age, height, weight, BMI, history of hip fracture, fall(s) in past year, complicating conditions and MMSE

| Attribute | Mean | SD or (%) |
|---|---|---|
| Age | 85.6 | 6.1 |
| Height (cm) | 145.0 | 7.2 |
| Weight (kg) | 44.4 | 8.3 |
| BMI | 21.1 | 3.6 |
| History of hip fracture | | (29.3) |
| Fall(s) in past year | | (45.1) |
| Complicating conditions | | |
| Heart disease | | (25.6) |
| Hypertension | | (47.4) |
| Previous stroke | | (40.6) |
| Diabetes mellitus | | (16.5) |
| Parkinsonism | | (6.8) |
| Arrhythmia | | (2.3) |
| Epileptic seizure | | (0.8) |
| Osteoarthritis | | (21.1) |
| Rheumatoid arthritis or related condition | | (3.0) |
| Eye disease (cataract or glaucoma) | | (27.8) |
| Total number of complicating conditions | 1.9 | 1.1 |
| MMSE (range: 0-30) | 22.3 | 4.4 |

SD=standard deviation; BMI=Body-mass index; MMSE=Mini-Mental State Examination.

**Table 3** Attributes of all 133 subjects about SF-8, FES and FIM motor items

| Attribute | Mean | SD or (%) |
|---|---|---|
| SF-8 | | |
| Physical Component Summary (PCS) | 41.4 | 10.8 |
| Mental Component Summary (MCS) | 50.1 | 8.4 |
| Physical functioning (PF) | 42.3 | 12.0 |
| Role physical (RP) | 41.7 | 12.6 |
| Bodily pain (BP) | 46.2 | 10.7 |
| General health perception (GH) | 47.5 | 7.4 |
| Vitality (VT) | 48.6 | 7.4 |
| Social functioning (SF) | 48.2 | 8.8 |
| Role emotional (RE) | 47.0 | 10.7 |
| Mental health (MH) | 48.7 | 7.9 |
| FES (range:10-100) | 45.0 | 22.3 |
| FIM motor items | | |
| Subscore of self-care (range: 6-42) | 33.0 | 7.6 |
| Subscore of sphincter control (range: 2-14) | 11.2 | 3.2 |
| Subscore of transfer (range: 3-21) | 15.7 | 4.2 |
| Subscore of locomotion (range: 2-14) | 7.0 | 3.6 |

SD=standard deviation; SF-8=MOS 8-Item Short-Form Health Survey; FES= Falls Efficacy Scale; FIM=Functional Independence Measure.

**Table 4** Spearman's rank correlation coefficient (rho) between PCS, MCS, subscales and other variables

| | PCS | MCS | PF | RP | BP | GH | VT | SF | RE | MH |
|---|---|---|---|---|---|---|---|---|---|---|
| FES | -0.50* | -0.08 | -0.53* | -0.51* | -0.31* | -0.23* | -0.32* | -0.25* | -0.21* | -0.27* |
| Age | 0.13 | -0.08 | 0.14 | 0.13 | 0.07 | -0.02 | -0.10 | 0.07 | 0.01 | 0.01 |
| BMI | 0.05 | 0.07 | 0.08 | 0.00 | 0.10 | 0.05 | 0.07 | 0.06 | -0.03 | 0.20* |
| History of hip fracture | 0.06 | -0.11 | -0.03 | 0.04 | 0.08 | -0.01 | 0.02 | -0.03 | -0.00 | -0.16 |
| Fall(s) in past year | -0.06 | -0.11 | -0.07 | -0.14 | -0.05 | -0.03 | -0.07 | -0.11 | -0.11 | -0.08 |
| Total number of complicating conditions | -0.20* | 0.07 | -0.08 | -0.17 | -0.21* | -0.10 | -0.02 | -0.16 | -0.02 | 0.01 |
| MMSE | -0.25* | 0.10 | -0.20* | -0.14 | -0.24* | -0.09 | -0.04 | -0.15 | 0.05 | -0.04 |
| Subscore of self care | 0.07 | 0.12 | 0.09 | 0.13 | -0.03 | -0.01 | 0.16 | 0.03 | 0.15 | 0.09 |
| Subscore of sphincter control | 0.04 | 0.03 | 0.04 | 0.07 | -0.13 | -0.02 | 0.05 | -0.01 | 0.06 | 0.01 |
| Subscore of transfer | 0.18* | 0.09 | 0.19* | 0.23* | 0.07 | 0.08 | 0.18* | 0.02 | 0.13 | 0.16 |
| Subscore of locomotion | 0.27* | 0.09 | 0.29* | 0.37* | 0.14 | 0.02 | 0.18* | 0.12 | 0.21* | 0.19* |

PCS=Physical Component Summary; MCS=Mental Component Summary; PF=physical functioning; RP=role physical; BP=bodily pain; GH=general health perception; VT=vitality; SF=social functioning; RE=role emotional; MH=mental health (MH); FES=Falls Efficacy Scale; BMI=Body-mass index; MMSE=Mini-Mental State Examination.

*$p<0.05$

**Table 5** Standardized partial regression coefficient (β) for PCS, MCS, and subscales as dependent variables by multivariate regression analysis

| | PCS | MCS | PF | RP | BP | GH | VT | SF | RE | MH |
|---|---|---|---|---|---|---|---|---|---|---|
| FES | -0.42* | -0.12 | -0.42* | -0.42* | -0.27* | -0.25* | -0.30* | -0.24* | -0.27* | -0.27* |
| BMI | 0.06 | 0.07 | 0.07 | 0.02 | 0.15 | 0.05 | 0.05 | 0.11 | -0.02 | 0.18* |
| Total number of complicating conditions | -0.13 | -0.00 | -0.03 | -0.08 | -0.19* | -0.13 | -0.03 | -0.16 | -0.05 | 0.01 |
| MMSE | -0.13 | 0.11 | -0.08 | -0.04 | -0.17 | -0.02 | 0.01 | -0.05 | 0.11 | -0.00 |
| Subscore of transfer | 0.04 | 0.01 | 0.04 | 0.05 | -0.00 | 0.09 | 0.08 | -0.05 | -0.01 | 0.08 |
| Subscore of locomotion | 0.14 | 0.01 | 0.19 | 0.21* | 0.02 | -0.12 | 0.04 | 0.04 | 0.14 | 0.04 |
| Age | 0.08 | -0.06 | 0.10 | 0.06 | 0.07 | -0.04 | -0.11 | 0.07 | -0.04 | 0.01 |
| $R^2$ | 0.33 | 0.03 | 0.33 | 0.33 | 0.19 | 0.09 | 0.13 | 0.11 | 0.12 | 0.15 |

PCS=Physical Component Summary; MCS=Mental Component Summary; PF=physical functioning; RP=role physical; BP=bodily pain; GH=general health perception; VT=vitality; SF=social functioning; RE=role emotional; MH=mental health (MH); FES=Falls Efficacy Scale; BMI=Body-mass index; MMSE=Mini-Mental State Examination.

*$p$<0.05

## 和文抄録

Relation between Falls Efficacy Scale (FES) and quality of life in nursing home residents in Japan

（施設入所高齢者の Quality of Life に対する転倒自己効力感尺度（Falls Efficacy Scale：FES）の関連）

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【目的】介護施設高齢者において Quality of Life に対する転倒自己効力感尺度(Falls Efficacy Scale：FES)の関連を検討すること。

【方法】介護施設入所中の 70 歳以上の女性で、Mini-Mental State Examination (MMSE)15 点以上の 133 名を対象とした。年齢、身長、体重、Body-mass index、大腿骨頚部骨折歴、過去 1 年間の転倒歴、合併疾患、MMSE、MOS 8-Item Short-Form Health Survey (SF-8)、FES、Functional Independence Measure (FIM)運動小項目(セルフケア、排泄コントロール、移乗、移動)を評価した。

【結果】SF-8 の Physical Component Summary (PCS)に対して FES は有意な関連を示した。下位尺度別では、特に Physical functioning (PF)、 Role physical (RP)のような physical QOL に対して FES は関連を示し、その関連の強さは移乗・移動能力よりも大きかった。

【考察】FES は、身体能力と精神的な自信に基づいており、精神的な自信は、4 つの主要な情報源から影響をうける。そして、これらの情報源は、日常生活に何らかの介護を受けることが多い介護施設高齢者では、環境(手すりなど)や介護に対する自分なりの解釈によって影響を受けやすいと考えられた。FES の向上に身体機能の改善は重要だが、高転倒リスク集団で日常生活に何らかの介護

を受けることが多い介護施設高齢者だからこそ、精神的な自信が重要であり、身体能力だけでなく精神的な自信を含む FES を考慮していくことが physical QOL 向上に必要であると示唆された。

**REFERENCE PAPER**

加藤智香子、猪田邦雄、長屋政博、徳田治彦、玉腰暁子、原田敦
施設入所高齢者の転倒恐怖とQOL、ADL、身体活動量との関連
Osteoporosis Japan. 15(2).317-319.2007.

## 【はじめに】

高齢者が、転倒恐怖を有すると活動性が低下し、身体機能の虚弱化が加速して、活動範囲が狭くなり、ひいてはQOLが低下するという悪循環に陥る。転倒恐怖感の測定には直接恐怖感を問う方法と転倒自己効力感尺度(Falls Efficacy Scale：FES)[1)]を用いる方法がある。FESを用いて地域高齢者を対象として、Activity of daily life(ADL)-Instrumental ADL(IADL)[2)]、Quality of life(QOL)[3)]、身体活動量[2)]との関連が報告されているが、施設入所高齢者におけるFESに関する報告はみられない。そこで、施設入所高齢者を対象に転倒恐怖をFESにて調査し、QOL、ADL、身体活動量との関連を検討した。

## 【方法】

### 対象

愛知県近隣の介護老人保健施設での70歳以上の女性におけるヒッププロテクター臨床試験参加者(35施設342名)のうち、Mini-Mental State Examination(MMSE)15点以上でインフォームドコンセントが十分取れる認知機能を有する133名(平均年齢85.6歳、平均介護度2.1、平均歩行レベルは軽介助)の横断的評価を対象とした。

### 横断的評価項目

年齢、Body Mass Index(BMI)、要介護度、大腿骨頚部骨折歴、過去1年間の転

倒歴、転倒・骨折リスクに関連する疾患（心疾患、高血圧、脳卒中、糖尿病、関節疾患、眼疾患）、MMSE、FES [1]、The MOS 8-Item Short-Form Health Survey( SF-8)[4]、Functional Independence Measure( FIM)運動項目、身体活動量を評価した。

*Falls Efficacy Scale (FES)* ―FES は 10 の ADL 項目において、転ばずに自信をもって出来るかを大変自信がある(1 点)～全く自信がない(10 点)で評価する(計 10－100 点)[1]。よって、点数が低いほど高い転倒自己効力感を意味する。なお、本研究では、施設入所者を対象としたので、施設内における ADL に当てはめて使用した。

*SF-8* [4] ―SF-8 は SF-36 の短縮版調査票である。8 つの下位尺度から Physical Component Score (PCS)と Mental Component Score (MCS)を求めた。

*FIM 運動項目*―FIM 運動項目は 13 項目から成り、全介助 1 点から完全自立 7 点で評価する(計 7－91 点)。尚、本研究では、歩行項目に車椅子移動は含ます、歩行のみで判定した。

*身体活動量*―歩行が監視以上の 83 名には身体活動量として、ライフコーダ EX((株)スズケン)を使用して 1 週間の平均歩数/日を計測した。

**統計学的検定**

全ての統計は SPSS14.0J を用いて行われた。有意水準は 5%未満とした。FES の合計点により 4 つの層に分類 [低得点層、平均－Standard deviation( SD)層、平均＋SD 層、高得点層]して比較検討した。名義変数には $\chi 2$ 検定を、連続変数に対しては one-way ANOVA(One-way analysis of Variance)及びポストホック比較として Turkey's HSD 検定を用いた。

**倫理的配慮**

名古屋大学及び国立長寿医療センター倫理委員会の承認を受けて実施した。

## 【結果】

FES の合計点は平均 45.01±22.32 点であった。そこで FES を 4 つの層[10～20 点 21 名、21～45 点 46 名、46～70 点 48 名、71～100 点 18 名]に分類し比較検討した(表 1 )。4 層間で年齢、BMI、要介護度、頚部骨折歴、疾患については有意な差はみられなかったが、低得点層(高い転倒自己効力感を有する)は、その他の層(21～100 点)に比して転倒歴が少なかった(14.3% vs. 38.9%～56.5%)。SF-8 では、転倒自己効力感が低下すると (FES の得点は高くなる)PCS は段階的に有意に低下がみられたが(図 1(a))、MCS には差がみられなかった。FIM 運動項目も転倒自己効力感が低下すると有意に低下がみられたが(図 1(b))、歩数には有意な差がみられなかった。

## 【考察】

施設入所高齢者の FES は、地域在住高齢者の報告[2)3)]と同様に過去 1 年間の転倒歴、PCS、FIM 運動項目に有意な関連がみられた。Tinetti らによる地域在住高齢者の報告では身体活動量の指標として質問紙票を用い、FES と相関ありとしている[2)]。今回、施設入所高齢者における我々の調査では身体活動量の指標として歩数を用いたところ、FES との関連はみられなかった。そこで、同じ歩数という指標で地域在住高齢者(女性 5 名、平均年齢 77.6±2.1 歳)を調査したところ、平均歩数は 7112 歩であった。一方、本研究における施設入所高齢者の歩数は 487～1188 歩、平均 1107 歩と非常に少なかった。このように、元々の歩数が少ない施設入所高齢者では転倒恐怖による影響が歩数に反映されにくいと考えられた。施設入所高齢者の転倒恐怖による身体活動量への影響を検討するには、より詳細な調査が必要であろう。

## 【結論】

施設入所高齢者において転倒自己効力感が低下すると、ADL、身体的な QOL

には段階的な低下がみられたが、精神的な QOL や身体活動量(歩数)には差がみられなかった。

**【謝辞】**

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1) Tinetti ME, Richman D, Powell L. Falls efficacy as a measure of fear of falling. *J Gerontol* 1990; **45**: 239-243.
2) Tinetti ME, Mendes de Leon CF, Doucette JT, Baker DI. Fear of falling and fall-related efficacy in relationship to functioning among community-living elders. *J Gerontol* 1994; **49**: M140-M147.
3) Lachman ME, Howland J, Tennstedt S, Jette A, Assmann S, Peterson EW. 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* 1998; **53**: 43-50.
4) Fukuhara S, Suzukamo Y. *Manual of the SF-8 Japanese version*. Kyoto: Institute for Health Outcomes & Process Evaluation Research, 2004.

**表 1. FES 層別による比較**

| | 転倒自己効力感 高 ← → 低 | | | | |
|---|---|---|---|---|---|
| | 10～20 点 | 21～45 点 | 46～70 点 | 71～100 点 | |
| | (n=21) | (n=46) | (n=48) | (n=18) | |
| | 平均 or (%) | 平均 or (%) | 平均 or (%) | 平均 or (%) | p value[a] |
| 年齢 | 87.29 | 84.63 | 85.98 | 84.94 | 0.37 |
| BMI[b] | 21.02 | 20.85 | 21.65 | 20.64 | 0.66 |
| 要介護度 | 2.00 | 1.96 | 2.13 | 2.33 | 0.62 |
| 頚部骨折歴 | (23.8) | (28.3) | (31.3) | (33.3) | 0.91 |
| 転倒歴 | (14.3) | (56.5) | (50.0) | (38.9) | 0.01* |
| 転倒・骨折リスクに関連する疾患合併 | | | | | |
| 心疾患 | (23.8) | (26.1) | (31.3) | (11.1) | 0.42 |
| 高血圧 | (42.9) | (50.0) | (47.9) | (44.4) | 0.95 |
| 脳卒中 | (23.8) | (43.5) | (39.4) | (55.6) | 0.23 |
| 糖尿病 | (19.0) | (17.4) | (14.6) | (16.7) | 0.97 |
| 関節疾患 | (23.8) | (23.9) | (16.7) | (22.2) | 0.83 |
| 眼疾患 | (19.0) | (28.3) | (33.3) | (22.2) | 0.61 |
| MMSE[c] | 21.24 | 21.02 | 23.31 | 24.00 | 0.02* |
| SF-8[d] | | | | | |
| PCS[e] | 49.32 | 44.12 | 38.46 | 33.21 | 0.00* |
| MCS[f] | 51.82 | 50.28 | 50.51 | 46.75 | 0.28 |
| FIM[g]運動項目合計点 | 73.71 | 67.91 | 66.77 | 56.28 | 0.01* |
| 身体活動量 | | | | | |
| 歩数[h] | 1188.73 | 1480.03 | 824.63 | 487.29 | 0.14 |

*p<0.05

[a]One-way analysis of Variance (ANOVA)及び $\chi^2$ 検定

[b]Body-mass index

[c]Mini-Mental State Examination

[d]MOS 8-Item Short-Form Health Survey

[e]Physical Component Score

[f] Mental Component Score

[g]Functional Independence Measure

[h] 歩数は監視歩行以上の 83 名(10～20 点=16 名,21～45 点=31 名,46～70 点=30 名,71～100 点=7 名)

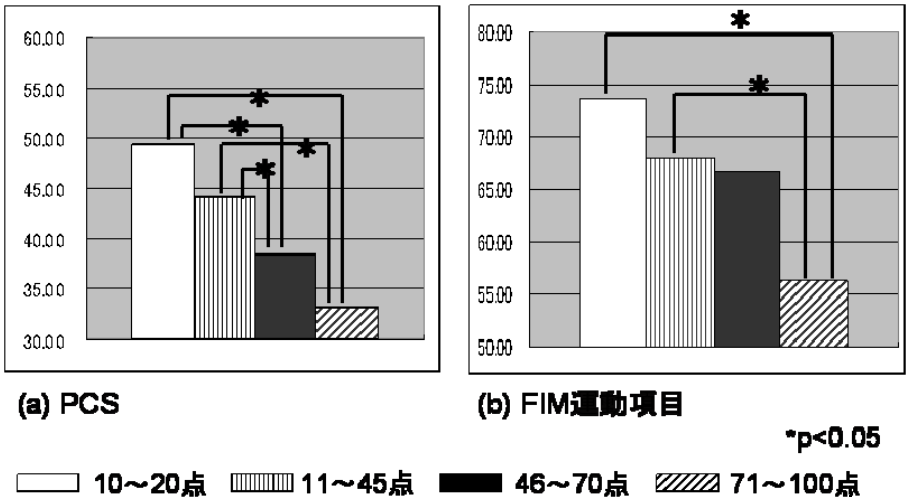


図 1. (a) Physical Component Score(PCS)、(b) Functional Independence Measure(FIM) 運動項目のポストホック比較(Turkey's HSD 検定)