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RELATION OF FALLS EFFICACY SCALE (FES) TO QUALITY OF LIFE AMONG NURSING HOME FEMALE RESIDENTS WITH COMPARATIVELY INTACT COGNITIVE FUNCTION IN JAPAN

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ABSTRACT

The purpose of this study was to investigate the relation of the Falls Efficacy Scale (FES) to quality of life (QOL) among nursing home residents. The subjects were 133 institutionalized women aged 70 years or older. They had comparatively intact cognitive function, with a Mini-Mental State Examination (MMSE) score of 15 or more, and could provide sufficient informed consent for a questionnaire survey. We evaluated their age, height, weight, body-mass index, history of hip fracture, history of fall(s) within the past year, complicating conditions, MMSE, Medical Outcomes Study 8-Item Short-Form Health Survey (SF-8), FES, and their subscores for Functional Independence Measure (FIM) motor items (self care, sphincter control, transfer, locomotion). There was a significant relationship between the Physical Component Summary (PCS) of SF-8 and FES. In each subscale, FES showed significant relations that were especially close in physical functioning (PF) and role physical (RP), with those relations proving stronger than those of the subscores of transfer and locomotion. In conclusion, the present results suggested that taking account of mental confidence is important for physical QOL, and that falls self-efficacy, including not only physical activity per se but also mental confidence, should be given prominence in the physical QOL of the institutionalized elderly.

Key Words: Falls Efficacy Scale, Fear of falling, Quality of life, Institutionalized elderly

INTRODUCTION

Although people live longer as a result of advances in economic development and medicine, a greater proportion of the population in aging societies is afflicted with chronic disease. Improving quality of life (QOL) through various interventions is thus a worthy goal. Efforts to

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prevent falls and fall-related trauma are one way to accomplish this goal. 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 QOL, that impact is not limited to the direct physical trauma; there are also long-term psychological effects, such as a fear of falling and depression.[2,3] Fear of falling was defined by Tinetti *et al*.[4] 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. 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,[2,5] and overall QOL will also be diminished.

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),[6] which is a method of assessment that was developed based on the self-efficacy theory proposed by Bandura.[7] Although the method of asking directly about fear of falling is a simple one, neither its reliability nor validity has been sufficiently established. On the other hand, FES has proved to be both reliable and valid.[8] There have been studies on the relation between FES and QOL in the community-dwelling elderly.[9,10] 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 fear of falling is greater,[2] and QOL will predictably be further diminished.

If the relation between fear of falling and QOL is strong, then it may be hoped that interventions to ease fear of falling would contribute to improving QOL. Such interventions among community-dwelling elderly are reportedly effective in the area of motor ability, particularly that which focuses on balance.[12] However, there are only a few reports on fear of falling in the institutionalized elderly[8,12] due to their often deteriorated cognitive function and physical infirmity. In Japan there are only reports dealing with motor functions,[13] but no reports that address the relation between fear of falling and QOL. Therefore, as a first step toward improving QOL through interventions against fear of falling among the institutionalized elderly, we have investigated that relation using the FES, the reliability and validity of which have been adequately demonstrated.

METHODS

Subjects

The subjects for this study were 133 institutionalized female elderly with comparatively intact cognitive function, who had a Mini-Mental State Examination (MMSE) score of 15 or more, and could provide sufficient informed consent for a 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,[6] 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).[6] 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 reliability 0.71 (Pearson's correlation coefficient).[6] 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 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. In order to ascertain the influence of this modification, nine participants (mean age 85.2 years) were retested after 2 weeks, and internal consistency or reliability was confirmed (Cronbach's α=0.91, Pearson's correlation coefficient = 0.72, $p = 0.03$).

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]

Statistical methods

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

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 60 subjects and one without 73 subjects falls in the past year.

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, even though their MMSE was above 15, lacked sufficient cognitive ability to provide informed consent for surveys using questionnaires. The present study was therefore conducted with the remaining 133 subjects.

The attributes of all 133 subjects were shown in Table 1. 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 2). Table 3 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, and were stronger than those for the transfer and locomotion subscores.

In a secondary analysis, the relation of FES to PCS in the group that had fallen in the past year was slightly weaker 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 subjects were 133 institutionalized female elderly with a comparatively intact cognitive function. Because so many elderly nursing home residents suffer a diminished cognitive function, 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 of MMSE 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 greater fear of falling than elderly people living at home,[2] which further decreases their QOL. However, since the relation of FES to QOL in a high-risk fall group has not been investigated, we made it the subject of the present study.

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.[6] That result was in line with our prediction that the falls self-efficacy of the institutionalized elderly would be lower than that for those still residents of a community (the lower the falls self-efficacy is, the higher

Table 1 Attributes of all 133 subjects.

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
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; BMI = Body-mass index;
MMSE = Mini-Mental State Examination;
SF-8 = MOS 8-Item Short-Form Health Survey;
FES = Falls Efficacy Scale; FIM = Functional Independence Measure.

Table 2 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*

FES = Falls Efficacy Scale; BMI = Body-mass index; MMSE = Mini-Mental State Examination.
*$p<0.05$

Table 3 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*
Age	0.08	–0.06	0.10	0.06	0.07	–0.04	–0.11	0.07	–0.04	0.01
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
R^2	0.33	0.03	0.33	0.33	0.19	0.09	0.13	0.11	0.12	0.15

FES = Falls Efficacy Scale; BMI = Body-mass index; MMSE = Mini-Mental State Examination.
*$p<0.05$

the FES score).

Among the community-dwelling elderly, FES showed a significant relation to PCS,[10] with PF showing an especially high correlation in each subscale, followed by SF, BP, VT, and RP.[9] This study suggested that among the institutionalized elderly, similar to the community-dwelling elderly, FES was significantly related to PCS, and that among the subscales the relation was especially strong with PF and RP.

The relation of FES to PF and RP, as items related to physical QOL, was stronger 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 institutionalized elderly whose physical ability had clearly deteriorated, it was predicted that the transfer or locomotion subscores might strongly relate to PF and RP rather than FES. Interestingly, the relation of FES to PF and RP was stronger than the relations of either transfer or locomotion subscores. The FES is based on both physical ability judged by disease/disability and by mental confidence (self-efficacy),[6] with the latter being affected by four main information sources: "enactive mastery experience," "vicarious experience," "verbal persuasion," and "physiological and affective states." This information influences mental confidence based on an individual's interpretation.[7] Since some type of care is needed in daily life for many nursing home residents, mental confidence tends to be readily influenced by the way a resident experiences that care. It is reported that interventions against fear of falling are effective among the community-dwelling elderly in the area of motor ability, particularly that which focuses on balance.[12] While it is important to attempt to reduce the fear of falling 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 that includes many people who require some type of care in daily life), considering mental confidence is important for physical QOL. We suggested that falls self-efficacy, including not only physical activity per se but also mental confidence, should be given prominence in the physical QOL of the institutionalized elderly. Although causal relationships could not be determined in this study since it was a cross-sectional analysis, we conjectured that raising falls self-efficacy might contribute to improving physical QOL.

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 weaker 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.[10] Fear of falling may be influenced by various other factors in addition to the experience of falling. On the other hand, the possibility cannot be ruled out that FES excessively reflects psychological and social factors, while inadequately reflecting the fear of falling that accompanies falls.

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 institutionalized 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 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?"[6] 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 that the results of this study cannot be extrapolated to all elderly care institution residents.

In conclusion, FES was related to PCS, and that relation was particularly strong for the items of PF and RP, which were related to physical QOL. The strength of that relation was superior to that with the transfer or locomotion subscores. It becomes progressively more difficult to improve physical function in the institutionalized elderly because of their advanced age and chronic diseases. The results of the present study suggested that considering mental confidence is important for physical QOL, and that falls self-efficacy, including not only physical activity per se but also mental confidence, should be given prominence in the physical QOL of the institutionalized elderly. We expect that evidence for the effectiveness of interventions to reduce fear of falling and improve QOL among the nursing home elderly will be forthcoming in the not too distant future.

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