

The Relationship between Falling and Quality of Life for The Elderly over 65 : Using Korean community health survey

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Abstract

Purpose : Few studies have examined the relationship between elderly falls and quality of life (QOL) in a large general population. Furthermore, although many studies have investigated the relationships between socio-demographic factors and falls, relatively few studies have evaluated the associations of places and environments with QOL of fall. The purpose of the scheme was to identify the relationship between falls and QOL in a large sample of the elderly.

Methods : This study used raw data from the 2013 Korean community health survey. A total of 228,781 people participated in the 2013 study among them 61,552 people were aged 65 or older. Authors also excluded 40 people whose QOL confirmation was unclear. Therefore, final analysis was conducted 61,512 senior citizens. The survey contained questions about the occurrence of falls, number of falls occurring per year, location of occurrence, and cause of falls. QOL was measured using the EQ-5D, an evaluation tool developed by the EuroQol group.

Results : The results showed a statistically significantly lower QOL to little fear and full of fear as compared with no fear of falls ($p < .05$). The number of falls was statistically significantly lower in one, two, and three or more times, than in zero (i.e. no falls) ($p < .05$). In the falling environments, fall experience, but not related to lighting ($p > .05$), had a significant lower in QOL compared without the experience ($p < .05$).

Conclusion : This study concluded that there is a strong connection between fall and QOL to the elderly, particularly regarding the number of occurrences, place, and environment. However, we found that an environment (e.g. the lack of lighting) might not affect QOL. It means that when the experts who make an effective tool or intervention may not need to consider indoor and outdoor darkness.

Key Words : accidental falls, elderly, epidemiology, fear, quality of life

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I. Introduction

Since older adults experience a decrease in motor performance because of aging, they tend to fall more frequently. In clinical field, fall prevention is a key issue in geriatric pathology (Hamed et al., 2018). Falling down as a result of a deficit of balance and muscle weakness is very common among the elderly. Furthermore, falls may cause serious disabilities in daily life, and even fractures that death as a result of fractures (Boddaert et al., 2014; Jeon et al., 2014; Mortazavi et al., 2018; Wang et al., 2015). Many older adults with a history of falls suffer from the fear of falling, as they have been restricted in mentally and physically after falling (Hornyak et al., 2013). According to a recent report, approximately 60 % older adults with a fall experience fall again within one year after the first incident (Goswami, 2017).

Quality of life (QOL) is a central factor in our lives. The fall may adversely affect elderly's activities, as it could decrease their satisfaction from life. A study indicates that this accident influences not only the elderly, but also their families (Morris et al., 2004). For example, a fall accident can cause elderly people to enter long-term care facilities early and spend a lot of money on their guardian's services. Furthermore, many elders express fear of falling after the accident, and fall experiences prevent the people from thinking of their home as safe places anymore. However, they must stay a long time at home due to their limitation to move to other places. Meanwhile, some articles say that relevance between QOL and fall has not been fully demonstrated (Rohde et al., 2009; Thiem et al., 2014). For example, a study predicted that health-related QOL would not reflect the current situation but would mean nursing-home placement and death in the future. Therefore, the research referred to the role of "the prognostic relevance of QOL" (Bilotta et al., 2011). Another study also reported that those who had the hip joint fracture of global QOL were lower than the control group even the

research investigated before the accident (Rohde et al., 2008). The point is that even if QOL is low for patients who have experienced falls in prior studies, it is unclear whether it has resulted from falls or has been low before the event.

Korean community health survey (KCHS) has conducted annually, and a lot of people have been involved in variety of health questions including QOL. Since, unlike other studies, this survey has been conducted by national policymakers, over 200,000 people have voluntarily participated in this project since 2008 (Kim et al., 2016). To the best of our knowledge, few studies have examined the relationship between elderly falls and QOL in a large general population. Furthermore, although many studies have investigated the relationships between socio-demographic factors and falls, relatively few studies have evaluated the associations of places and environments with QOL of fall. Therefore, the main purpose of the scheme was to identify the relationship between falls and QOL in a large sample of the elderly.

II. Methods

1. Korean community health survey

The project was conducted by the Korea centers for disease control and prevention (KCDCP) named KCHS in 2013. The survey period was about three months, from August 16, 2013 to October 31, 2013, and well-trained researchers directly visited selected households to conduct a 1:1 Electronic Survey (i.e. CAPI; computer assisted personal interviewing). As a national sample survey, the KCHS selected samples representing the population prior to each year's survey. A sample was created in cooperation with national address data of the Ministry of the Interior and Safety and a number of housing types and generations, and a sample number of households was extracted by the

ministry of land, transport and maritime affairs so that an average of 900 people could be examined by each public health center. To handle this project successfully, many parts were involved such as the KCDCP, 17 cities, 253 public health centers, and 36 responsible universities. A total of 228,781 people participated in the 2013 study among them 61,552 people were aged 65 or older. Authors excluded 40 people whose QOL confirmation was unclear.

Therefore, final analysis was conducted 61,512 senior citizens. The general characteristics of the subject are summarized in Table 1. The protocol of the KCHS was reviewed and approved by the institutional review board of the KCDCP (2013-06EXP-01-3C). Written informed consent was directly obtained from all participants in the KCHS.

Table 1. Characteristics of the fallers

	n*	Population % [†]	%SE
Gender			
Men	25282	42.8	0.2
Women	36230	57.2	0.2
Age (years)			
65~74	36657	63.4	0.3
75 ≤	24855	36.6	0.3
Fallers			
No	47337	76.5	0.3
Yes	14175	23.5	0.3
Fear of fall			
No	21826	36.9	0.3
Little	24186	39.7	0.3
Full	15458	23.5	0.3
Number of falls			
0	47337	76.5	0.3
1	8825	15.2	0.2
2	2960	4.9	0.1
3 ≤	2390	3.4	0.1
Falling places			
Inside house			
No history of falls	47337	98.7	0.1
No	258	0.5	0.0
Yes	513	0.8	0.1
Outside house			
No history of falls	47337	98.7	0.1
No	145	0.2	0.0
Yes	626	1.1	0.1
Causes and environments of falling			
Slippery floor			
No history of falls	47337	98.7	0.1
No	465	0.8	0.1
Yes	306	0.5	0.0
Bumping into people or objects			
No history of falls	47337	98.7	0.1
No	625	1.1	0.1
Yes	146	0.3	0.0
Getting caught on the sidewalks or doors			
No history of falls	47337	98.7	0.1
No	506	0.9	0.1
Yes	265	0.4	0.0
Steepness			
No history of falls	47337	98.7	0.1

Table 1. Characteristics of the fallers (continue)

	n*	Population %†	%SE
No	679	1.2	0.1
Yes	92	0.2	0.0
Dark atmosphere			
No history of falls	47337	98.7	0.1
No	754	1.3	0.1
Yes	17	0.0	0.0
Ankle sprain			
No history of falls	47337	98.7	0.1
No	390	0.7	0.1
Yes	381	0.6	0.1
Sudden dizziness			
No history of falls	47337	98.7	0.1
No	394	0.7	0.1
Yes	377	0.7	0.1

*n: sample size, †%: estimated percent of the population

2. Study measures

The survey contained questions about the occurrence of falls, number of falls occurring per year, location of occurrence, and cause of falls. The aim was to identify the relevance of falls to the QOL. Fall was defined as the experience of falling over the past year, and the place where it occurred was classified into bathroom/pool, room, kitchen, living room/ floor, stairways, and other parts of a household. Farming and fishing facilities, transport facilities, sports/athlete’s locations, commercial/service facilities, and other types of locations outside of the house were classified as outside the home. QOL was measured using the EQ-5D, an evaluation tool developed by the EuroQol group. The questionnaire consisted the three-point Likert scale (1=no problem, 2=little problem, and 3=serious problem) for the following five items: (1) mobility, (2) self-care, (3) usual activity, (4) pain / discomfort and (5) anxiety / depression.

3. Statistical analyses

The analysis was carried out in consideration of the complex sampling design for more accurate analysis in accordance with the KCHS data guideline. Frequency analysis was performed to identify the distribution of the participants. The statistical analysis was performed using

SPSS version 23.0 for Windows software. To find out the relationship between the fall of the people aged over 65 years old and their QOL, multiple linear regression analysis was conducted adjusting for gender, age, educational level, monthly household income, living with family, residential area, physical activity, self-rated health, hypertension, diabetes mellitus, osteoarthritis and osteoporosis. The significance level for the statistical test was $\alpha =0.05$.

III. Results

To assess the relationship between QOL and falls in elderly people aged 65 years old or older, multiple linear regression analysis was performed under adjusting for gender, age, educational level, monthly income, living with family, residential area, physical activity, self-rated health, hypertension, diabetes mellitus, osteoarthritis and osteoporosis. The results showed a statistically significantly lower QOL to little fear (B=-0.041, p<0.001) and full of fear (B=-0.184, p<0.001) as compared with no fear of falls (Table 2).

The number of falls was statistically significantly lower in one (B=-0.038, p<0.001), two (B=-0.073, p<0.001), and three or more times (B=-0.164, p<0.001), than in zero (i.e.

no falls). As to the falling places, the experience in the house had ($B=-0.276$, $p<0.001$) and had not ($B=-0.149$, $p<0.001$) a significantly lower QOL as compared with no experience, and the experience to the outside house had ($B=-0.198$, $p<0.001$) and had not ($B=-0.364$, $p<0.001$) a significantly lower QOL than no the experience (Table 2).

In the falling environments, fall experience, but the

reason was not slippery floor ($B = -0.259$, $p<0.001$), falls experience with slippery floor ($B = -0.207$, $p<0.001$), falls experience, but the reason was not caused by person or object ($B=-0.246$, $p<0.001$), experienced falls with person or object ($B=-0.219$, $p<0.001$), fall experience, but not related to lighting ($B=-0.243$, $p<0.001$), had a significant lower in QOL compared without the experience (Table 2).

Table 2. The relationship between fall and quality of life

Characteristics	B	SE	t	P-value*	R ²
Fear of falling (/No)					
Little	-.041	.003	-13.196	<.001	.291
Full	-.184	.005	-36.856	<.001	
Number of falls (/0)					
1	-.038	.005	-7.752	<.001	.213
2	-.073	.009	-7.980	<.001	
3≤	-.164	.013	-12.759	<.001	
Falling places					
Inside house (/No)					
No	-.149	.032	-4.693	<.001	.210
Yes	-.276	.028	-9.678	<.001	
Outside house (/No)					
No	-.364	.052	-6.970	<.001	.211
Yes	-.198	.024	-8.238	<.001	
Falling environments					
Slippery floor (/No)					
No	-.259	.030	-8.784	<.001	.209
Yes	-.207	.035	-5.907	<.001	
People and objects (/No)					
No	-.246	.025	-9.693	<.001	.208
Yes	-.219	.054	-4.080	<.001	
Sidewalk and doorsill (/No)					
No	-.266	.029	-9.026	<.001	.209
Yes	-.197	.035	-5.647	<.001	
Steepness (/No)					
No	-.254	.025	-10.115	<.001	.209
Yes	-.145	.046	-3.168	<.002	
Dark atmosphere (/No)					
No	-.243	.023	-10.425	<.001	.208
Yes	-.197	.110	-1.796	.073	
Ankle sprain (/No)					
No	-.263	.035	-7.585	<.001	.209
Yes	-.217	.028	-7.737	<.001	
Sudden dizziness (/No)					
No	-.172	.027	-6.484	<.001	.210
Yes	-.296	.034	-8.818	<.001	

*adjusted for gender, age, educational level, monthly household income, living with family, residential area, physical activity, self-rated health, hypertension, diabetes mellitus, osteoarthritis, osteoporosis

IV. Discussion

The present study showed that QOL was related to the fear of falling and the number of fall incidents. The results of the present study are consistent with previous reports (Davis et al., 2010; Roe et al., 2009). Interestingly, just one fall experience, or even a little fear of the fall, degraded QOL. Previous studies noted that, in about 30% cases, a person fall again within a year after the first fall incident, and the risk of falling increases with age (Gill et al., 2005; Huang et al., 2010). These results indicate that clinics should be considered not only exercise programs to prevent falling, but also psychological aspects of falling patients.

There are a variety of extrinsic factors that can cause falls, such as poor lighting, steep or uneven surfaces, improper use of assistive tools, and unsuitable shoes (Faulkner & Burns, 2010; Lord et al., 2006). When these complex elements are combined, falling may occur—both inside and outside the house (Phelan & Ritchey, 2018). These findings are in close agreement with our findings. For instance, our results suggest that falling degrades QOL regardless of where a fall occurred, and the problem is that the medical cost of care resulting from falls is considerable in the short and long term. In 2015, the direct costs were estimated to exceed \$50 billion (Florence et al., 2018). Selective interventions are required to reduce that costs and efficiency, and this for several reasons. First, depending on the applied method of exercise, the risk of falls might be reduced by 20%–40% (Gillespie et al., 2012). Second, evidence is available showing that home-based exercises to prevent falls should be carried out as long as possible; however, over time, the frequency decreases (Picorelli et al., 2014; Yardley et al., 2006). This could be attributed to the limitations on the exercise program that has not sufficient motivated the participants. Third, even though decision-making process is very important to care about elderly's health when applying an intervention for falling but it might not include the process, because most of these

exercises were not designed by the specialists (e.g. physiotherapists) (Mittaz Hager et al., 2019). Thus, in the present study, we emphasize that well-designed programs are needed not only to avoid risk to health during the exercises, but also to improve QOL.

There is a wide consensus in the literature that a fall does not have a single cause—rather, several factors, such as age-related changes, medical conditions, as well as other individual and environmental variables, should be considered in research on falls (Inouye et al., 2007; Phelan & Ritchey, 2018; Phelan et al., 2001). This is congruent with our findings that demonstrated the elderly people who experienced a fall generally find that the particular environments at the time of the accident do not affect the QOL; rather, the fall experiences themselves degrade QOL. Interestingly, in the present study, we did not find significant differences of QOL between the participants who experienced a fall due to poor lighting and those without the history of falls. The results of the survey differed from our expectation. Likewise, previous studies have highlighted that inadequate lighting can be associated with falling, leading to a lower QOL (Carter et al., 1997; Lord et al., 2006; Phelan & Ritchey, 2018). Therefore, it is important to examine the cause of the differences. Based on our results, the following reasons can be highlighted. First, several causes and environments (e.g. slippery floors, bumping into people or objects, getting caught on the sidewalks or doors, steepness, ankle sprains, and dizziness) presented in the present study are relatively difficult to adjust according to the participants' will. In other words, even though people who have been suffering from falling because of darkness, they think that it may fix it any time when they touch a button for lighting up. Therefore, poor lighting is not a serious problem to them. Second, perhaps a person who experienced a fall without lighting up would have learned to avoid such spaces for the fear of falling. This learning or mind control would be able to disappear from the fear of falling. Third, as can be seen in the results in Table 1, lighting was the least frequent of the fall environments

(Mazharizad et al., 2015). Therefore, it is thought to be the least significant part for the fall.

Limitations of this experiment are as follows. First, KCHS was included only Korean participants in our dataset. Second, since we used the KCHS raw data, the results of this study do not provide relevant information based on cities or villages. Further research is constantly needed in developed countries with a large elderly population. Of course, this article has some limitations, but the authors still think that our results show very meaningful conclusion. Especially because the relationship between the fall and QOL, which had been ambiguous, was clearly shown using a large sample.

V. Conclusion

To sum up, this article shows a strong connection between fall and QOL to the elderly, particularly about the number of occurrences, places, causes, and environments of falling. However, we found that an environment (e.g. the lack of lighting) might not affect QOL. It means that when the experts who make an effective tool or intervention may not need to consider indoor and outdoor darkness. Therefore, when preparing national policies, governments should pay keen attention to QOL as well as to the treatment method of falls. Further research should focus on the effect of state policies so that to improve QOL.

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