

Original Article

# Health-related quality of life of community-dwelling stroke survivors: a comparison of fallers and non-fallers

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**Abstract.** [Purpose] The purpose of this study was to compare the health-related quality of life (HRQOL) of stroke survivors between fallers and non-fallers. [Subjects] The subjects were community-dwelling stroke patients (n = 4,560) in South Korea. All stroke patients were diagnosed by a doctor. [Methods] This study used raw data from the 2014 Korean Community Health Survey. The survey was conducted from August 16, 2014, to October 31, 2014. Trained surveyors visited households selected from the sample and conducted face-to-face interviews. The content of the survey included demographic data and HRQOL. [Results] Fallers were 1,425 (31.25%), non-fallers 3,125 (68.53%), and 10 (0.22%) answered unknown. Gender, living status, occupation, and smoking experience differed significantly between the fallers and non-fallers. The domains of HRQOL, excluding VAS, also differed significantly between the fallers and non-fallers. [Conclusion] These results provide important base data for rehabilitation services for fallers among stroke survivors.

**Key words:** Fall, Health-related quality of life, Stroke

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## INTRODUCTION

Falls are a serious complication after suffering a stroke, with up to 76% of stroke survivors experience falls<sup>1,2</sup>. Falls are extremely common at all recovery stages after a stroke<sup>3</sup>. Stroke survivors who have fallen have an increased incidence of serious adverse outcomes, including loss of self-confidence in ability to perform daily activities, fractures, depression, and mortality, compared with adults who have not suffered a stroke<sup>4, 5</sup>. Serious fall injuries become aggravating factors in health-related quality of life (HRQOL), putting limitations on mobility, necessitating admission to nursing homes, and increasing health-care expenditures<sup>6, 7</sup>. HRQOL combines the concepts of health status and quality of life (QOL)<sup>8</sup>. HRQOL refers to an individual's perceived physical and mental health, and an assessment of HRQOL helps us understand the association between health and daily life functioning<sup>9</sup>. Although stroke patients may recover most of their physical functions, their QOL decreases 40% compared with before stroke<sup>10</sup>. In addition, they report lower HRQOL than the general population<sup>11</sup>. Falls and HRQOL of older adults have been studied; however, the literature is limited regarding differences between fallers

and non-fallers and the direct influence of falls on stroke patients<sup>3, 12–16</sup>. Identifying the relationship between falls and HRQOL of stroke patients would provide important base data for rehabilitation services. This study compared the HRQOL of stroke survivors between fallers and non-fallers in to increase favorable outcomes.

## SUBJECTS AND METHODS

This study used raw data from the 2014 Korean Community Health Survey (KCHS). The survey was conducted from August 16, 2014, to October 31, 2014, by the Korean Centers for Disease Control and Prevention (KCDCP). The KCHS uses a cross-sectional design to extract data from health centers in South Korea. The protocol of KCHS was reviewed and approved by the institutional review board of the KCDCP (2013-06EXP-01-3C). This study used the data for the subset of community-dwelling stroke patients (n = 4,560) diagnosed by a doctor. Trained surveyors visited households selected from the sample and conducted face-to-face interviews with a computer notebook loaded with survey.

The content of the survey included demographic data and the EQ-5D-3L (3 level version of the EuroQoL 5-dimensional questionnaire). The demographic questions addressed age, gender, living status, occupation, experience of smoking, experience of drinking, participation in hard physical activities (e.g., exercise such as running, riding a bicycle quickly, fast swimming, and carrying heavy objects for more than 10 minutes in a normal a week), participation in moderate physical activity (e.g., exercise such as slow swimming,

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**Table 1.** Characteristics of the subjects

Parameters		Fallers	Non-fallers
		n (%)	n (%)
Age	19–65	343 (32.4)	815 (67.6)
	≥ 65	1,082 (34.2)	2,320 (65.8)
Gender*	Male	632 (29.3)	1,675 (70.7)
	Female	793 (38.8)	1,460 (61.2)
Living status*	Living alone	858 (31.2)	2,168 (68.8)
	Living with spouse	567 (38.3)	967 (61.7)
Occupation*	Employed	346 (29.1)	970 (70.9)
	Unemployed	1,079 (35.2)	2,165 (64.8)
Experience of drinking	Yes	961 (32.9)	2,151 (67.1)
	No	464 (35.4)	984 (64.6)
Experience of smoking*	Yes	580 (29.9)	1,455 (70.1)
	No	845 (36.8)	1,678 (63.2)
Participation in hard physical activity	Yes	149 (31.9)	356 (68.1)
	No	1,276 (33.8)	2,777 (66.2)
Participation in moderate physical activity	Yes	286 (32.4)	660 (67.6)
	No	1,139 (33.9)	2,472 (66.1)
Participation in walking	Yes	872 (33.7)	1,917 (66.3)
	No	553 (33.3)	1,217 (66.7)

\*p&lt;0.05

playing table tennis, badminton, and carrying light objects for more than 10 minutes in a normal a week), and participation in walking (e.g., walking to work or school, and exercise for more than 10 minutes in a normal a week). The EQ-5D-3L is a generic measure of health status widely used in a variety of patient populations<sup>17</sup>. It defines health in terms of five domains: mobility, self-care, usual activities, pain/discomfort, and anxiety/depression. Each domain is scored on a 3-point Likert scale: no problem (1), a moderate problem (2), or an extreme problem (3). In addition, the subjects rate their overall health on a visual analogue scale (VAS) from 0 (worst imaginable health state) to 100 (best state).

The collected data were analyzed using a complex sampling design and SPSS Statistics 21.0 software (IBM Corporation, Armonk, NY, USA). Individual weights were applied to estimate the population. The  $\chi^2$  test was performed to identify differences in the demographic distributions of fallers and non-fallers. A general linear model was used to compare HRQOL between the fallers and non-fallers. The significance level used in statistical testing was  $\alpha = 0.05$ .

## RESULTS

Among the 4,560 stroke survivors who were studied, 1,425 (31.25%) reported falls during the 1 year period. For the remaining subjects, 3,125 (68.53%) reported no falls and 10 (0.22%) answered unknown. In the demographic distribution, gender ( $p = 0.000$ ), living status ( $p = 0.001$ ), occupation ( $p = 0.012$ ), and experience of smoking ( $p = 0.001$ ) differed significantly between the fallers and non-fallers (Table 1). The domains of HRQOL, excluding VAS, also differed significantly between the fallers and non-fallers. The means of the fallers were higher than those of the non-fallers in each

domain (mobility = 0.183,  $p = 0.000$ , self care = 0.184,  $p = 0.000$ , usual activities = 0.031,  $p = 0.000$ , pain/discomfort = 0.280,  $p = 0.000$ , anxiety/depression = 0.232,  $p = 0.000$ ) (Table 2).

## DISCUSSION

This study identified differences in the HRQOL of stroke survivors between fallers and non-fallers. The results show that 31.25% of the survey population experienced falls during the 1 year period. This fall incidence is lower than the 76% previously reported for post-stroke populations<sup>1, 2</sup>, however, similar results were reported by Schmid et al<sup>18</sup>). A possible explanation for the difference may be that this study included only community-dwelling adults and excluded in-patients in acute or rehabilitation hospitals. It was reported that in acute-care settings, 3.8 to 22.0% of in-patients experienced falls while 10.5 to 47.0% of in-patients experienced falls in rehabilitation hospitals<sup>19</sup>.

Regarding the demographic distribution, the faller group contained more females than males and more unemployed than employed subjects. Yoo<sup>20</sup>) reported falls occurred more often among women than among men. Another study of older adults in the community also found that women were more likely to fall than men, and that those participating in economic activity were more likely to fall than those who were not<sup>15</sup>), but the differences were not significant. The results of other studies of older adults and people without a history of stroke contradict those of the present study<sup>14, 21, 22</sup>).

The HRQOL results of fallers and non-fallers were similar to those of previous studies<sup>14, 21</sup>). In particular, the study of Choo et al.<sup>14</sup>), which used a short form-8 health survey to assess various subdomains of HRQOL, found there were sig-

**Table 2.** Difference of HRQOL between fallers and non-fallers

HRQOL	Parameters	Mean	Estimate (SE)	95% CI
Mobility*	Fallers	1.798	0.183 (0.026)	0.131–0.234
	Non-fallers	1.615	1 (ref.)	
Self-care*	Fallers	1.582	0.184 (0.031)	0.123–0.245
	Non-fallers	1.398	1 (ref.)	
Usual activities*	Fallers	1.781	0.203 (0.031)	0.143–0.263
	Non-fallers	1.578	1 (ref.)	
Pain/discomfort*	Fallers	2.018	0.280 (0.033)	0.214–0.345
	Non-fallers	1.738	1 (ref.)	
Anxiety/depression*	Fallers	1.631	0.232 (0.032)	0.170–0.294
	Non-fallers	1.399	1 (ref.)	
VAS	Fallers	59.777	–4.785 (3.465)	–11.577–2.006
	Non-fallers	64.562	1 (ref.)	

\*p<0.05. SE: standard error; ref.: reference or baseline; CI: confidence interval

nificant differences in physical function, bodily pain, social function, role functioning-emotional, and mental health. In addition, bodily pain showed the highest difference between the two groups, similar to the results of the present study. Fallers and non-fallers among community-dwelling stroke survivors and older adults exhibited differences in HRQOL. Thus, falls are an important factor in HRQOL.

The current study had some limitations. First, the study excluded stroke patients in hospital and those who had died as a result of a fall. Also, the results do not reflect the opinions and situations of all those who had suffered a stroke. However, as the subjects were selected from a systematically randomized sample by trained surveyors, the potential for generalization to the community-dwelling stroke population is strong. Second, the results do not distinguish between cause and effect of variables related to falls because of the cross-sectional design. Further studies with a longitudinal design are needed to identify the cause and effect of falls and consider variables such as the number of falls, fear of falling, and circumstances of falls.

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