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# Knowledge of Stroke and Heart Attack Symptoms and Risk Factors Among Rural Elderly People: A Questionnaire Survey

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## ABSTRACT

**Background and Objectives:** To determine the level of knowledge of stroke and heart attack (HA) symptoms and risk factors of cardiovascular disease (CVD) in rural elderly people who are at risk for CVD. **Subjects and Methods:** A total of 444 adults over the age of 60 living in a rural province of Korea with at least one CVD risk factor participated in this survey. **Results:** A total of 72.5% of the participants had hypertension and 28.4% had diabetes, whereas approximately 40% exhibited over two CVD risk factors. The mean knowledge scores for HA symptoms (4.3/9) were lower than scores for stroke symptoms (5.8/9), and the mean knowledge score for risk factors was 7.3/11. Stepwise multiple regression analyses showed that old age, low level of education, and low income level were the determining factors for low knowledge levels of stroke and HA symptoms as well as CVD risk factors. A low perceived risk of stroke or HAs also predicted a low knowledge of CVD risk factors. **Conclusion:** Community-wide public campaigns are needed, which are designed to help elderly people in rural areas with low education levels and socioeconomic status at risk for CVD to improve the awareness of stroke and HA. (**Korean Circ J 2011;41:259-264**)

**KEY WORDS:** Cardiovascular diseases; Aged; Signs and symptoms; Risk factors; Knowledge.

## Introduction

Cerebro-cardiovascular diseases (CVD) such as stroke and ischemic heart disease are the second leading cause of death in Korea. In 2008, death rates from stroke and ischemic heart disease among Koreans were 56.5 and 25.7 per 100,000 people, respectively.<sup>1)</sup> The incidence rate of stroke in Korea is twice as high as that in Western countries.<sup>2)</sup> The rising incidence of CVD might be related to an increase in the aging population. The older population  $\geq 65$  years of age is 9.9% in Korea, which may increase to 14.3% over the next 10 years.<sup>1)</sup> For people above the age of 65, stroke and ischemic heart disease have been identified as the 3rd and 4th major reasons for hospi-

talization, respectively.<sup>3)</sup> Approximately half of the patients enrolled in the Korean Acute Myocardial Infarction Registry and Korean Stroke Registry were over the age of 65.<sup>4)5)</sup> Old patients with acute myocardial infarction (AMI) and stroke had a markedly high incidence of in-hospital mortality and an increased length of hospital stay, resulting in higher medical expenses.<sup>5-7)</sup>

The proportion of older people at risk of developing chronic diseases living in rural areas has significantly increased, consequently increasing the financial burden of health care expenditure on families and communities in Korea.<sup>11)</sup> The current survey was conducted in Jeonnam, a province with the largest proportion of elderly people in Korea: 14.9% of the total population is above the age of 65, with a high proportion of elderly women who live alone.<sup>1)</sup> Disparities in seeking health services due to education and income levels are leading to emerging social and health issues in Korea, especially for the elderly population in rural areas.<sup>8)</sup> Elderly people living in rural areas are amongst the most vulnerable populations for developing CVD.

Early recognition of symptoms and prompt medical care are essential for providing appropriate treatment to prevent adverse clinical outcomes in patients with stroke or AMI.<sup>9)</sup>

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However, the Korean registry studies showed that only 20.5% of patients with acute ischemic stroke were admitted within 3 hours after symptom onset<sup>5)</sup> and 40.1% of AMI patients were admitted to hospital 6 hours after the acute event.<sup>4)</sup> In particular, older adults with stroke or heart attack (HA) symptoms were admitted significantly later to the hospital than younger patients.<sup>9)</sup> This might be associated with poor recognition of symptoms and risk factors of stroke and HA as well as of required actions. In addition, ischemic stroke and HA have the same lifestyle risk factors, and public awareness of these risk factors is essential. Therefore it is important to identify the level of awareness about stroke and HA symptoms and risk factors in rural elderly people, in an effort to help them prevent and detect CVD.

## Subjects and Methods

### Study design

This study was a descriptive survey to identify the level of knowledge of stroke and HA symptoms, as well as CVD risk factors among rural elderly people.

### Setting and sample

Elderly people or patients who visited 3 public health care centers and 2 medical centers located in Jeonnam province were included as subjects of this study. People above the age of 60 who had at least one CVD risk factor and were able to communicate verbally were selected. Written permissions from the directors of the community health care and medical centers were obtained for the study. After agreement of a survey method at the meeting, data were collected by 5 trained research assistants, who were senior nursing students. Four hundred and fifty-one individuals participated in the survey, of which 444 provided complete datasets and were selected for further analysis. Data were collected from January to March, 2009.

### Data collection

Informed written consent was obtained from all the study participants. The participants were interviewed individually and the questionnaires were assisted if required. The questionnaire consisted of items pertaining to warning symptoms of stroke and HA as well as CVD risk factors identified by the American Heart Association.<sup>10)</sup> The structured questionnaire contained 18 items, including 9 stroke and 9 HA warning symptoms, as well as 11 items for CVD risk factors. The questionnaire included terms that have been disclosed as public information by Korean medical and nursing textbooks, and were validated by two nursing professors. One point was given for each correct answer and a zero was given for each incorrect answer; the individual scores were added to obtain a total score. Dichotomous data in the Kuder-Richardson 20

(KR-20) formula were used to calculate the internal consistency of stroke and HA symptoms, and CVD risk factors, and the alphas were 0.80 and 0.85, respectively. In addition, the subjects were also asked what they would do if they thought someone was having a stroke or HA, and their ability to perceive the possible occurrence of a stroke or a HA was assessed.

### Statistical analysis

Data were analyzed using Statistical Package for the Social Sciences version 14.0 (Chicago, IL, USA). Demographic characteristics of the subjects and response rates to symptoms and risk factors were calculated. Chi-square, t-test, and analysis of variance were used to examine the relationship between the demographic variables and knowledge scores of symptoms and CVD risk factors. The total knowledge scores of symptoms regarding stroke and HA, and the knowledge score of CVD risk factors were normally distributed, respectively. There was no presence of multicollinearity between predictor variables in the multiple regression models. Stepwise multiple regression analyses were used to determine the predicting factors for low levels of knowledge of symptoms and CVD risk factors.

## Results

### Demographic and health-related characteristics of the participants

The average age of participants in this study was 72.3 ( $\pm 7.3$ ) years. A majority of the participants (68.5%) were women. A total of 38.3% of the participants lived alone and 25.5% never received regular health checkups. A total of 72.5% of participants had hypertension and 28.4% had diabetes for average lengths of  $7.2 \pm 5.9$  and  $9.1 \pm 7.8$  years, respectively. Among those who had hypertension or diabetes, 18.7% reported that they no longer visited the doctor nor took any medication. A total of 18% of the participants had a family history of stroke or ischemic heart disease and 39.6% had 2 or more risk factors for CVD. In response to the question on the possibility of stroke and/or HA occurrence, 32.4% reported a possibility of stroke and 31.1% reported a possibility of a HA. In response to the question on the actions that they would take if stroke or HA symptoms occurred, 54.1% reported that they would call emergency services, and 24.3% responded that they would go to the doctor's office and call their family members (Table 1 and 2).

### Knowledge of stroke and heart attack symptoms and cardiovascular disease risk factors

In response to structured questionnaire items on the symptoms of stroke and HA, the participants, on average, accurately identified 5.8 out of the 9 stroke symptoms and 4.3 out of the 9 HA symptoms. The average knowledge score of partici-

**Table 1.** Demographic characteristics of the study participants (n=444)

Variables	Category	n	%
Gender	Male	140	31.5
Age (years)	61-70	175	39.4
	71-80	209	47.1
	81-92	60	13.5
Education level	No school	195	43.9
	Elementary school	154	34.8
	Middle school	45	10.1
	High school	33	7.4
	College	17	3.8
Monthly income (won)	<1 million	361	81.3
	1-2 million	71	16.0
	>3 million	12	2.7
Living with	Alone	170	38.3
	Spouse	211	47.5
	Children	63	14.2

**Table 2.** Health-related characteristics of the study participants (n=444)

Variables		n	%
Regular health check-up	No	113	25.5
Smoking	Current smoker	40	9.0
	Ex-smoker	34	7.7
Drinking	≥ 3 times/week	37	8.3
Regular exercise	None	193	43.5
Co-morbid diseases (answer duplicated)	Hypertension	322	72.5
	Diabetes	126	28.4
	Heart disease	50	11.3
	Arthritis	81	18.2
	Dyslipidemia	26	5.9
	Past history of stroke	13	2.9
	Management of hypertension/Diabetes*	Prescribed medication taken	210
Regular clinic visit		151	34.0
No clinic visit for a long time		18	4.1
Family history of stroke/Ischemic heart disease	No treatment at all	65	14.6
	Yes (Parents/Siblings)	80	18.0
Number of cardiovascular risk factors <sup>†</sup>	One	268	60.4
	Two	128	28.8
	Three	43	9.7
	Four	5	1.1
Perceived risk of stroke occurrence	Yes	144	32.4
Perceived risk of heart attack occurrence	Yes	138	31.1
Expected action when stroke/heart attack witnessed	Call 911	240	54.1
	Send to hospital	108	24.3
	Call family members	74	16.6
	Send to drug store	11	2.5
	Send to oriental clinic	11	2.5

\*Included the subjects who had hypertension or diabetes, †Number was summated by the frequency of hypertension, diabetes, smoking, past history of heart disease or stroke, and family history of stroke

participants about CVD risk factors was 7.3 out of 11; 78.4% of the participants accurately identified hypertension as a risk factor, and more than 60% of the participants recognized overall CVD risk factors. However, only 47.1% recognized diabetes as a risk factor for CVD. Less than 60% of the participants recognized sudden loss of vision in one or both eyes and nausea or vomiting, as stroke and HA symptoms. Chest pain or discomfort (75.2%) and shortness of breath (70.3%) were the most widely recognized symptoms of a HA. However, less than 50% of the participants were accurately able to identify other HA symptoms (Table 3 and 4).

#### Factors associated with lower knowledge of symptoms and risk factors

The results of bivariate analyses are shown in Table 5. There were significant differences between gender, age, education level, monthly income, and knowledge of stroke/HA symptoms and CVD risk factors. The level of knowledge about CVD risk factors was significantly lower in the partici-

**Table 3.** Accurate response rates of stroke and heart attack symptoms (n=444)

Stroke	n (%)	Heart attack	n (%)
Sudden dizziness	343 (77.3)	Chest pain or discomfort	334 (75.2)
Sudden numbness or weakness of the arm or leg, especially on one side of the body	327 (73.6)	Shortness of breath	312 (70.3)
Sudden trouble speaking or understanding	318 (71.6)	Light headedness/Fatigue	226 (50.9)
Sudden trouble walking, loss of balance or coordination	314 (70.7)	Pain or discomfort in one or both shoulder or arms	187 (42.1)
Sudden numbness or weakness of the face especially on one side of the body	297 (66.9)	Epigastric discomfort/Indigestion	186 (41.9)
Sudden confusion	285 (64.2)	Nausea	176 (39.6)
Sudden severe headache with no known cause	277 (62.4)	Cold sweat	171 (38.5)
Sudden trouble seeing in one or both eyes	252 (56.8)	Back pain or discomfort	155 (34.9)
Nausea or vomiting	169 (38.1)	Neck or jaw pain	151 (34.0)

**Table 4.** Accurate response rates for cardiovascular disease risk factors (n=444)

Risk factors	n (%)
Hypertension	348 (78.4)
Stress	324 (73.0)
Aging	306 (69.9)
Family history of cardiovascular disease	292 (65.8)
Excessive drinking	290 (65.3)
Obesity	283 (63.7)
Lack of exercise	282 (63.5)
High lipid/Salt diet	277 (62.4)
Smoking	277 (62.4)
Hypercholesterolemia	264 (59.5)
Diabetes mellitus	209 (47.1)

pants who had no perceptions on the possibility of having a stroke or HA than those who had not ( $p < 0.01$ ). However, there were no significant differences in the levels of knowledge on symptoms and CVD risk factors according to clinical characteristics such as the presence of hypertension or diabetes, the lengths of period of those risk factors, and the number of CVD risk factors. Multiple stepwise regression analyses were conducted to determine the variables that can predict the lower level of knowledge of stroke/ HA symptoms and CVD risk factors. The analyses included all significant variables confirmed by bivariate analyses. Lower education, older age, and lower monthly income were found to be independent predictors of the low knowledge of stroke and HA symptoms. In addition, a low perceived risk of stroke or HA was a predictor of the knowledge of CVD risk factors (Table 6).

## Discussion

The participants identified 7.3 of the 11 CVD risk factors: Hypertension was the most frequently identified risk factor (78.4%), followed by stress (73.0%), whereas diabetes was

the least frequently identified risk factor (47.1%). These findings are consistent with earlier reports in Korea which showed that subjects lacked awareness of diabetes as a CVD risk factor.<sup>11)12)</sup> People who are aware of the risk of stroke and HA may be more likely to engage in preventive practices. Therefore, community-based public education, with particular emphasis on the management of diabetes is needed, in order to prevent stroke or HA among elderly people suffering from diabetes.

More than 70% of the participants identified sudden dizziness, pain on one side of the body, and trouble speaking, as stroke symptoms. This finding was also consistent with a previous report.<sup>13)</sup> The least identified stroke symptoms were sudden loss of vision in one or both eyes and nausea followed by vomiting. This finding was in agreement with previous studies that showed vision impairment to be the least identified warning symptom.<sup>14)</sup> More than 60% of the participants of this study did not identify back pain, neck/jaw pain, cold sweat, and nausea as HA symptoms. These findings were also consistent with a previous study of Korean immigrants,<sup>15)</sup> as well as an additional study of Korean subjects.<sup>16)</sup> Considering average accurate response rates, the participants of this study reported a limited knowledge about most HA symptoms (4.3/9) except chest pain and shortness of breath, as compared to stroke symptoms (5.8/9). Previous studies have reported that atypical symptoms such as gastrointestinal or respiratory symptoms without chest pain, were the most significant factors for predicting a lower use of thrombolytic therapy, and were associated with in-hospital complications.<sup>17)18)</sup> Furthermore, patients with an atypical presentation were more likely to be older, female, and have hypertension and/or diabetes.<sup>17-19)</sup> Thus, public campaigns targeting elderly people and those with diabetes are necessary to improve their awareness of all possible symptoms including the atypical symptoms.

Multiple regression analyses showed that lower levels of education and monthly income, and older age significantly

**Table 5.** Differences of knowledge of symptoms and risk factors according to sample characteristics

Variables	Stroke/HA symptoms (18 points)			CVD risk factors (11 points)			
	M±SD	t/F	p	M±SD	t/F	p	
Gender	Female	9.5±4.5	3.209	<0.001	6.7±3.4	3.724	<0.001
	Male	11.1±4.3			7.9±2.9		
Age	>80 years	9.0±4.4	5.881	0.003	6.1±3.4	7.403	0.002
	71-80 years	9.7±4.5			6.8±3.4		
	61-70 years	11.0±4.4			7.8±3.0		
Education	None	8.9±4.6	12.610	<0.001	6.0±3.4	20.583	<0.001
	≥Elementary	10.8±4.4			7.7±2.9		
Monthly income	≥Middle	11.3±4.2	-3.202	0.001	8.3±2.8	-3.843	<0.001
	<1,000,000	9.7±4.6			6.8±3.4		
Number of risk factors	>1,000,000	11.5±3.8	1.663	0.507	8.3±2.6	-0.802	0.423
	One	10.2±4.4			7.0±3.3		
Perceived risk of HA/Stroke	Two	9.9±4.7	-1.516	0.130	7.3±3.3	-3.051	0.002
	≥Three	9.1±3.9			7.8±2.9		
	Yes	10.5±4.5			7.9±3.1		
	No	9.7±4.6			6.8±3.4		

HA: heart attack, CVD: cardiovascular disease

**Table 6.** Predicting factors on the low knowledge of stroke and HA symptoms, and CVD risk factors

Dependent variables	Adjusted R <sup>2</sup>	Model test		Predicting factors	β	t	p
		F	ρ				
Knowledge of symptoms	0.101	11.188	<0.001	Low education	0.142	2.922	0.004
				Older age	-0.129	-2.793	0.007
				Low income	0.116	2.432	0.015
Knowledge of CVD	0.138	15.690	<0.001	Low education	0.197	4.153	<0.001
				Older age	-0.152	-3.281	0.001
				Low perceived risk of stroke/HA	-0.141	-3.134	0.002
Risk Factors				Low income	0.115	2.467	0.014

Gender was adjusted for each regression modeling. HA: heart attack, CVD: cardiovascular disease

predicted the lower levels of knowledge of stroke and HA symptoms and CVD risk factors. These findings are supported by previous studies.<sup>11)20)</sup> Similar findings have also been reported in a review of fifteen international studies which showed that elderly people and those with lower levels of education tended to have less knowledge of risk factors and warning signs of stroke as compared to younger age groups and those with higher levels of education.<sup>21)</sup> A low level of education and old age were also shown to affect HA symptom recognition.<sup>22)</sup> In this study, 78.6% of the participants attended only elementary school and 81.3% had a monthly income of under one million won. The low levels of education and socioeconomic status were the defining demographics of our elderly population. The knowledge disparity among elderly people needs to be addressed in programs aimed at helping them recognize and take prompt treatment-seeking action through simple guidelines, when early warning symptoms appear.

Participants who had never considered the possibility of having a HA had significantly lower levels of knowledge of CVD risk factors, and this finding was consistent with a pre-

vious study.<sup>23)</sup> Approximately 69% of participants with one or multiple CVD risk factors did not perceive themselves to be at risk of a stroke or HA in this study. The decision to seek treatment is made based on whether the patients believe their physical symptoms to be serious and life threatening.<sup>9)</sup> Public education can be an effective way to improve awareness of the risk factors for stroke and HA. A previous study reported that a 4 month educational intervention program for elderly adults with a mean age of 75 years was effective in improving awareness about stroke and HA symptoms.<sup>24)</sup> Therefore, public health education for the elderly at risk of CVD should focus on improving awareness of having a stroke or HA to increase the knowledge of symptoms and risk factors of CVD, and to facilitate preventive actions.

The limitation of this study was that the study subjects were recruited from only one rural province with a high proportion of elderly women and from the clients of community health care centers. Hence, these findings cannot be generalized for all elderly people living in rural areas in other provinces or for home residents.

## Conclusions

Knowledge of HA symptoms among rural elderly people in Korea was lower than that of stroke symptoms. Lower education level, older age, and a lower monthly income were predicting factors for a lower knowledge of stroke/HA symptoms and CVD risk factors. In addition, a low perceived risk of HA independently predicted a low knowledge of CVD risk factors. Educational interventions are needed to increase the recognition of early warning symptoms and risk factors for CVD among rural elderly clients visiting community health care or medical centers, particularly those with low levels of education and income.

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