Influence of Knowledge about Cardio-Cerebrovascular Disease Symptoms on Self-Management Behaviors in Patients with Atrial Fibrillation

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Abstract

Aim: This study aimed to assess stroke risk and Cardio-cerebrovascular symptom knowledge in patients with atrial fibrillation, and to determine the relationship between knowledge and self-management in these patients.

Methods: Using a cross-sectional study design, 120 patients from an outpatient clinic were recruited from two medical centers. Data were collected using a structured questionnaire, and data on risk factors and clinical characteristics were collected from patients' medical records. The data were analyzed by one-way analysis of variance, Pearson correlation coefficient, and hierarchical multiple linear regression analysis.

Results: The risk of stroke was estimated to be 82.5%. For the assessment of patient cardio-cerebrovascular symptom knowledge the correct answer rate was as 37%. Hierarchical regression analysis showed that knowledge about cardio-cerebrovascular disease symptoms was a significant predictor, explaining an additional 28.3% of the variance of self-management behaviors.

Conclusions: These results suggest the need for education programs that include information about cardio-cerebrovascular disease symptoms and the risks of stroke occurring as a complication, in order to enhance self-management behaviors in patients with atrial fibrillation.

Key words: *Atrial fibrillation, Cardiovascular disease, Cerebrovascular disease, Knowledge, Self-management*

Introduction

In atrial fibrillation (AF), the most common arrhythmia, electrical flow occurs in various parts of the atrium, causing irregular and rapid tremors of heart contraction[1]. In a study of 1,483 elderly people over 60 years of age, atrial fibrillation was diagnosed by electrocardiogram screening in 1.0% of participants in their 60s, 3.3% in their 70s, and 7.2% in their 80s[2]. The prevalence rate is expected to increase with the aging population[2]. AF presents symptoms such as palpitations, dizziness, fainting, and chest pain, and increases the risk of heart failure with reduced ventricular function and stroke due to blood clots formed by the accumulation of blood[3]. Complication morbidity doubles mortality in women and increases mortality in men by 1.5 fold[3], increases risk of stroke by 5 times, risk of heart failure by 3 times, and dementia by 2 times[1].

In one stroke registration study, 19% of ischemic cerebral infarction was found to be caused by AF[4]. AF was reported to have high severity and mortality[5]. In

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most patients with AF, their condition is associated with hypertension, diabetes, and hyperlipidemia, which are risk factors for cardio-cerebrovascular disease(CVD)[6]. According to AF management guidelines, antithrombotic treatment should be determined by estimating the stroke risk of AF patients to prevent the occurrence of CVD[1]. Because the choice of AF treatment depends on symptoms and stroke risk, it is necessary to first understand the stroke risk level of AF patients in order to effectively manage AF.

One study found that most patients with AF were unaware of their risk for CVD. In that study, the high-risk group showed no difference in stroke perception compared with the low-risk group[7]. In order to prevent delays in the treatment of stroke, raising awareness of the symptoms is essential. The American Heart Association privides AF patient education that includes stroke risk categories and stroke symptoms[8]. AF guidelines suggest that appropriate treatment to prevent aggravation of the disease includes awareness of possible heart failure[1]. Therefore, patients with AF, a disease that can progress to fatal CVD, should be assessed and provided with adequate education on the symptoms related to the expected complications. Self-management in patients with AF requires continuous medication and lifestyle management to prevent disease exacerbation and to prevent complications[3]. Self-management behavior strategies include preventive health behaviors, such as perception of disease that recognizes symptoms and risk factors, drug side effects management, pulse monitoring for symptom monitoring, and awareness of complications[9]. Patients with AF need to understand the importance of early detection and coping with CVD in order to improve their lifestyle and prevent complications by adjusting to long-term treatment. Therefore, it is necessary to confirm whether knowledge about symptoms affects the self-management behavior of patients with AF.

Aims

The purpose of this study was to assess the risk of stroke, CVD symptom knowledge, and self-management behavior, and to identify the factors that affect self-management behavior in patients with AF.

• Determine participant stroke risk, CVD symptom knowledge, and self-management behavior.

• Explore differences in CVD symptom knowledge and self-care behavior according to the general characteristics of the participants and the risk of stroke.

• Identify the effect of patient CVD symptom knowledge on self-management behavior.

Method

Study design and participats

This study used a descriptive research design. The study participants were patients with AF who visited outpatient cardiac units at two general hospitals. The inclusion criteria were official diagnoses of AF and AF for more than 3 months. The exclusion criteria were having been diagnosed less than 3 months prior to the study and changed treatment within the past 3 months. Using the G*Power 3.1 program, the number of participants was determined based on the calculations of previous studies[10], with a median effect size of 15, regression analysis with a significance level of 05, a power of 80%, and 8 independent variables (age, gender, education level, family structure, economic status, duration of illness, stroke risk, and knowledge about symptoms). Considering a dropout rate of 10%, it was determined 125 initial participants were required to ensure a total of at least 109 participants. Data were collected on 123 patients. There were 3 incomplete questionnaires, and therefore the data from 120 participants were analyzed.

Measures

Stroke risk

The CHA_2DS_2-VASc score (congestive heart failure, hypertension, age ≥75 [doubled], diabetes mellitus, prior stroke or transient ischemic attack [doubled], vascular disease, age 65–74, female) was used to assess the risk of stroke[11]. In the calculation of the CHA□DS□-VASc score, 1 point is added to the score for the presence of congestive heart failure, hypertension, diabetes, or vascular disease, 2 points for being female, 2 points for having a history of stroke, 2 points for being over 75 years of age, and 1 point for being between 65 and 74 years of age. A combined score of 0 indicates low risk, 1

indicates medium risk, and 2 or more indicates high risk.

Cardio-cerebrovascular(CVD) symptom Knowledge

CVD symptom knowledge was measured by the American Heart Association's revised instrument for warning signs of stroke, myocardial infarction, and heart failure[12]. Items of the instrument are on five stroke symptoms, five myocardial infarction symptoms, and seven heart failure symptoms. In the scoring of the measurement, a correct answer is given 1 point. "Do not know" or incorrect answers are given 0 points. The total score ranges from 0 to 17 points. Higher scores indicate more CVD symptom knowledge. For this instrument, the Kuder-Richardson 20 in study[12] and in the current study were .74 and .91, respectively.

Self-management behaviors

A questionnaire developed by Xu et al[13]. was used to measure self-management behaviors of patients with AF. Permission to translate the questionnaire into Korean was obtained from the original authors. The questionnaire was back-translated by a bilingual person proficient in both Korean and English. The Korean version was validated using content validity. The original questionnaire consisted of 13 items: 4 items on adherence to medication regimen, international normalized ratio monitoring, periodic follow-up, and daily pulse self-examination, and 6 on healthy lifestyle. The questionnaire items were measured on a 4-point Likert scale that ranged from 1 ("neither agree nor disagree") to 4 ("strongly agree"); the scores ranged from 13 to 52, with higher scores indicating greater self-management behaviors. Cronbach's α in Xu et al[13]. and in the current study were .86 and .79, respectively.

Data Collection

Data collection was carried out from March 2017 to September 2017 at the two outpatient cardiac units. Consent was obtained from the medical teams and medical staff. The questionnaire was self-administered, and the researcher and research assistant provided assistance when necessary. The questionnaire took about 20-30 minutes to complete. The terms of AF prevalence and stroke risk were checked with the electronic medical records.

Ethical Consideration

This study was conducted after approval from the research ethics committee of the institution (IRB No. 2017-02-007-004) collecting the data. The researcher explained the purpose, methods, and anonymity of the study to the study participants and informed them that taking part in the study was voluntary. Each participant provided prior written informed consent.

Data Analysis

Data were analyzed using IBM SPSS 22.0. Instrument reliability was assessed using Cronbach's α. Data on general characteristics, disease-related characteristics, stroke risk, CVD symptom knowledge, and self-management behavior were analyzed via real numbers, percentage, average, and standard deviation. Self-management behaviors was verified by Kolmogorov-Smirnov test (score = .065, p = .120), and the assumption of equal variance was confirmed by Levene's statistics. Differences in CVD symptom knowledge and self-management behaviors were determined using a one-way analysis of variance, and post-hoc testing was performed with the Scheffé test. The correlation between CVD symptom knowledge and self-management behavior was examined using Pearson's correlation coefficients, and a hierarchical regression analysis was performed to determine the effect on self-management behavior. In the testing of the regression model for multicollinearity, it was found that the correlation was .03 ~ .59, less than 0.8, the tolerance was 0.98, 0.1 or more, and the variation inflation factor was 1.37, less than 10. The Durbin-Watson statistic was 2.39, close to 2. There was no problem of autocorrelation.

Results

Demographic and disease-related characteristics of the participants

The average age of the participants was 69.3 ± 11.5 years, and 71 were males (59.2%). With regard to education level, 42.5% had elementary school education and under, and 85.0% lived with their families. The mean duration of AF was 46.2 ± 39.1 months. The major

comorbidities were hypertension (56.7%), diabetes (25.8%), and peripheral vascular disease (17.5%). Among the medication used by the participants, 37.5% were new oral anticoagulants; 33.3% of the patients used warfarin. The risk of stroke, assessed by the CHA_2DS_2-VASc score, was 7.5% in the low-risk group, 10.0% in the middle-risk group, and 82.5% in the high-risk group. The most common risk factor for stroke, as determined by the CHA_2DS_2-VASc score, was an age of 65 years or over (66.7%), followed by hypertension (56.7%), being female (40.8%), and having diabetes (25.8%) (Table 1).

CVD symptom knowledge and self-management behavior

The average score for CVD symptom knowledge was 6.30 ± 5.12 points, out of a possible 17 points, with a correct answer rate of 44% for stroke, 34% for myocardial infarction, and 32% for heart failure. The average score for self-management behavior was 35.32 ± 6.51, out of a possible 52 points (Table 2). The correlation between CVD symptom knowledge and self-management behavior was examined by univariate analysis (r=.57, p<.001).

Differences in CVD symptom knowledge and self-management behaviors according to participant characteristics and stroke risk

There were statistically significant differences in CVD symptom knowledge according to age (F = 4.51, p = .012) and education level (F = 6.88 p <.001). Self-management behaviors were significantly different according to age (F = 6.49 p = .002), education level (F = 6.29 p = .001), and duration of disease (F = 3.97 p = .021). However, there was no statistically significant difference in CVD symptom knowledge and self-management behavior according to the type of disease, type of medication taken, and risk of stroke (Table 1).

The effects of CVD symptom knowledge on self-management behavior

In the first step of the hierarchical regression analysis, age, education, and duration of illness, which were significantly affected by self-management behavior, were included in the model as independent variables (Adj R2 = .10, F = 5.42, p <.001). In the second step CVD symptom knowledge increased by 28.3% (β = 0.53, ΔR^2 = .28, p <.001). In the final model, age (β =-. 14, p = .041) and CVD symptom knowledge (β = .53, p = <001) were identified as significant influencing factors. The total explanatory power of the final model was 38% (Adj R2=.38, F=17.21, p<.001).

Table 1 Differences of CVD Symptom Knowledge and Self-management behaviors by Subjects' Characteristics (*N*=120)

Variables Categories		n (%) or M±SD	CVD symptom knowledge		Self-management behaviors	
			M±SD	t or F (p)	M±SD	t or F (p)
Age (years)		69.3±11.5	6.30±5.12	4.51 (.012) a>c†	35.32±6.51	6.49 (.002) a>c†
	<65a	40 (33.3)	8.08±4.77		37.40±6.19	
	65 ~ 74b	35 (29.2)	6.17±5.31		35.97±8.71	
	≥75c	45 (37.5)	4.82±4.87		33.10±7.68	
Gender	Men	71 (59.2)	6.49±4.78	0.25 (.621)	35.31±7.40	0.02 (.893)
	Women	49 (40.8)	6.02±5.61		35.45±8.67	

Cont... **Table 1 Differences of CVD Symptom Knowledge and Self-management behaviors by Subjects' Characteristics (*N*=120)**

Education	≤Elementary schoola	51 (42.5)	5.08±5.12	6.88 (<.001) c>a,b† d>b†	33.13±7.61	6.29 (.001) c>a†
	Middle schoolb	24 (20.0)	4.21±4.55		34.85±8.42	
	High schoolc	23 (19.2)	9.22±3.88		38.82±7.22	
	≥Colleged	22 (18.3)	8.36±5.01		37.18±5.91	
Living with	Spouse or Children	102 (85.0)	6.09±4.87	1.16 (.282)	35.35±8.08	0.09 (,926)
	Alone	18 (15.0)	7.50±6.34		35.81±7.92	
Monthly income (10,000Won)	<200	82 (68.3)	6.39±5.44	0.08 (.778)	35.16±8.41	0.31 (.578)
	≥200	38 (31.7)	6.11±4.40		3.5.81±6.75	
Alcohol drinking	Yes	37 (30.8)	5.87±5.11	1.94 (.166)	36.36±7.43	1.15 (.220)
	No	83 (69.2)	7.27±5.06		34.93±8.09	
Smoking	Yes	18 (15.0)	8.28±5.14	3.22 (.075)	33.92±4.83	1.29 (.258)
	No	102 (85.0)	5.95±5.06		35.62±8.30	
Time since diagnosed (month)		46.2±39.1	6.30±4.77	0.21 (.808)	35.36±7.91	3.97 (.021) b<c†
	≤12a	34 (28.4)	6.50±5.40		33.31±8.06	
	13□35b	19 (15.8)	6.84±5.96		37.76±8.11	
	≥36c	67 (55.8)	6.04±4.77		35.73±7.42	
Comorbidity	Yes‡	97 (80.3)	6.35±4.77	1.06 (.306)	34.67±7.73	1.38 (.255)
	Hypertension	68 (56.7)	6.09±5.06		35.73±7.78	
	Diabetes mellitus	31 (25.8)	7.10±4.93		34.67±7.24	
	Peripheral vascular disease	21 (17.5)	5.90±5.42		35.27±8.42	
	Heart failure	19 (15.8)	6.52±5.13		34.76±7.30	
	Previous stroke	17 (14.2)	6.13±4.53		33.81±7.92	
Medication	None	5 (4.2)	3.60±2.88	1.028(.392)	34.17±5.05	.270 (.847)
	Antiplatelets	30 (25.0)	6.90±4.95		35.26±7.91	
	NOAC	45 (37.5)	6.82±5.40		35.94±8.68	
	Warfarin	40 (33.3)	5.60±5.12		34.97±7.90	
CHA_2DS_2 -VASc score	Low risk (0)	9 (7.5)	7.71±4.36	1.05(.353)	35.87±5.45	1.38 (.255)
	Intermediate risk (1)	12 (10.0)	7.27±4.50		37.59±6.53	
	High risk (>2)	99 (82.5)	5.92±5.30		34.93±8.6	

†Scheffé test; ‡Multiple responses; CVD, cardiocerebrovascular disease; NOAC, new oral anti-coagulants; CHA_2DS-VASc score, congestive heart failure, hypertension, age, diabetes mellitus, prior stroke-vascular disease, age, sex female scheme score

Table 2 Levels of CVD Symptom Knowledge (*N*=120)

Variables	Categories (items)	Range	M±SD	Correct answer (%)
CVD symptom knowledge, Total (17)		0 ~ 17	6.30±5.12	37.0
	Stroke (5)	0 ~ 5	2.21±2.11	44.0
	Myocardial infarction (5)	0 ~ 5	1.71±1.54	34.0
	Heart failure (7)	0 ~ 7	2.28±2.15	32.0

CVD, cardio-cerebrovascular disease

Table 3 Influence of CVD Symptom Knowledge on Self-management behaviors adjusted for Covariates by Hierachical Regression Analysis (*N*=120)

Variables	Model 1					Model 2				
	B	SE	β	t	p	B	SE	β	t	p
(Constant)	51.15	8.54		6.49	<.001	42.97	3.74		6.33	<.001
Age (years)	-1.12	0.90	-.17	-1.62	.026	-0.85	0.52	-.14	-1.70	.041
Education	1.40	0.83	.83	1.68	.095	0.74	0.45	.10	1.04	.300
Time since diagnosed(Month)	0.01	0.02	.04	0.46	.644	0.01	0.01	.15	0.89	.377
CVD symptom knowledge						0.85	0.12	.53	6.80	<.001
	Adj. R^2=.10 F=5.42, p<.001					Adj. R^2=.38, $\triangle R^2$=.28 F=17.21, p<.001				

CVD, cardio-cerebrovascular disease

Discussion

The purpose of this study was to provide basic data for nursing interventions targeted at patients with AF, through the assessment of stroke risk, CVD symptom knowledge, and self-management behavior. The average age of the participants was 69.3 years, and 82.5% of the high-risk group had experienced stroke. In a previous study, the mean age of patients with AF was 74 years, and 87.7% were in the high-risk group[14]. One possible reason for the difference in the percentage of high-risk patients between the present study and the previous study may be that the average age of the participants in the present study was lower than that of the previous study.

As indicated by the scoring system of the CHA_2DS_2-VASc score, the risk of stroke increases with age. The risk factors found in a study by Tze-fan[15] differed from those in the present study in complications age, hypertension, being female, and heart failure. AF has been found to be 2.7 times higher in patients with hypertension, 1.6 times higher in patients with heart failure, and 1.3 times higher in patients with diabetes, according to the associated risk of stroke[16]. Comorbidities should be managed together to reduce the risk of cardio- cerebrovascular disease. However, in patients with coronary artery disease, accompanying diseases such as hyperlipidemia and hypertension have not been recognized as risk factors[17]. Since patients with AF are expected to have similar risk factors, it is necessary to emphasize the need for self-management of comorbid diseases to reduce the risk of stroke. The average score for CVD symptom knowledge was 6.30 ± 5.12 points, out of 17 possible points, in the present study, with a correct answer rate of 37%. It was much lower than the previous study[12], which reported a correct answer rate of 62% with using the same measurement tool. Emphasis on the prevent stroke[18], early education of AF patients, and appropriate coping measures should be promptly provided. In particular, for knowledge about heart failure symptoms, the average rate of correct responses was 32%, which was lower compared with stroke and myocardial infarction symptoms. In order to raise awareness of CVD, it is necessary to plan interventions that focus on prevention of disease progression and exacerbation, and health promotion. The average score for self-management behavior in the present study was 35.32 ± 6.51, which was lower than that of a previous study[13]. that used the same measurement tool. The average score in that study was 38.6. Lack of information on diseases and complications is likely to be an obstacle to effective self-management behavior.

In the present study, there were significant differences in CVD symptom knowledge by age and education level. In a study of patients with AF, conducted by the American Arrhythmia Association knowledge about stroke symptoms was higher with age and more education, similar to the results of the present study[19]. Education should be provided to groups of patients with AF that are at higher risk for stroke, and levels of AF management should be assessed to improve patient knowledge about acute symptoms of stroke and coping with symptoms.

In this study, hierarchical regression analysis was performed to determine the effect of symptom knowledge on self-management behavior when controlling the effects of general and disease-related covariates. In the univariate analysis, age, education level, and duration of illness were the significant influencing factors for age, and the explanatory power was 10%. Symptom knowledge was increased to 38%. In other words, symptom knowledge was a significant factor that increased 28% of self-management behavior. These findings support those of a previous study that indicated that disease-related knowledge is a highly influencing factor of self-management behavior in patients with heart failure[20]. In older patients, poorer self-management behavior is expected due to decreased understanding of the disease, slower awareness of the disease, and more difficulty in changing lifestyle behaviors. Therefore, before nursing intervention, personalized strategies should be provided after evaluating the age and learning competencies of the patient. One previous study found that patients with AF had a high level of uncertainty and depression that could affect self-management behavior[9]. In the future, it is necessary to conduct repeated studies to identify the influencing factors of self-management behaviors, including symptom knowledge and psychosocial variables, in patients with AF.

This study had two major limitations. First, results from the sample of outpatients may not be generalizable to all patients with AF. Second, this was a cross-sectional study that used self-reported data, and the causal relationships among stroke risk, knowledge, and self-management behavior could not be inferred. However, this study is meaningful in that it demonstrates that in patients with AF, knowledge about symptoms related to complications is insufficient for effective self-management.

Conclusions

In this study, 82.5% of patients with AF were at high risk for stroke. The rate of correct CVD symptom knowledge was 37%. The level of self-management

behavior for AF management was 35.32 ± 6.51, which was not high. Results of the hierarchical regression analysis indicated that CVD symptom knowledge was an independent factor of self-management behavior, and explanation ability was 38%. In order to improve self-management behavior in patients with AF, it is necessary to provide education that focuses on warning symptoms of complications such as stroke, myocardial infarction, and heart failure and is tailored to the age and knowledge level of the patient.

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