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Relationships Between Cognitive Function and Quality of Life of Elderly Stroke Patients

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Abstract

The purpose of this study was to assess the effects and find the correlation of LOTCA-G and SS-QOL on the cognitive function and quality of life of elderly stroke patients. The time period of the experiment was from March 1, 2018 to March 30, 2018, and the study sample was composed of 102 stroke out-patients who participated in the rehabilitation center in G-city and received treatment of LOTCA-G and SS-QOL. The raw scores of the cognitive function of the elderly stroke patients varied depending on their gender, age, education, and marital status, but the differences were not statistically significant. Second, the raw scores of the quality of life of the elderly stroke patients varied depending on their gender, age, education, and marital status, but only marital status showed significance ($p < 0.01$). The elderly stroke patients' cognitive function and the quality of life showed a statistically significant correlation ($p < 0.01$). LOTCA-G and SS-QOL generally showed significant correlation even among sub-categories, but energy, one of the sub-categories of quality of life, did not show significant correlation with any of the other sub-categories of cognitive function. By combining the study results, it was possible to see that there were high levels of correlation between cognitive function and quality of life in elderly stroke patients shown through LOTCA-G and SS-QOL. Based on this study, if the raw scores of cognitive function and quality of life could be validated and various basic data could be provided for increasing quality of life, it can be considered that the stroke patients' quality of life will be improved.

Keywords: *Stroke, Cognitive function, Quality of Life*

1. Introduction

According to 2017 statistics, the population of people older than 65 and entering status as seniors reached 7.2% out of the total population in 2000. In 2017, the senior population continually increased to 13.8%. By 2060, the attainment of a super-aged society is expected with the percentage increasing to 41.0% in South Korea [1]. With the increase of the senior population, their health and their health care has become a topic of major interest, in addition to an increased interest in age-related diseases. When looking into the causes of death of seniors above the age of 65, cancer and stroke ranked first and second place, respectfully. Out of the causes of death from a single disease, stroke occupied the highest percentage [2], and with its increased

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incidences following increasing age, stroke is one of the leading age-related diseases. Stroke is a general term of a cerebrovascular disease commonly ccaused by disorder of cerebrovascular circulation that causes difficulties in motor function, sensory function, perceptual function, cognitive function, speech ability, and psychosocial ability and lowers the quality of life. Out of these, cognitive function refers to the process by which an individual receives, processes, and uses the various sensory information from the environment in order to think and act. The scope of cognitive function can be classified into orientation, concentration, memory, attention, visual perception, space-time processing, language ability, problem solving, and executive functions [3]. The impairment of these cognitive abilities acts as an important element in reducing the patient's quality of life.

Due to the development of modern medicine, stroke patients show a high survival rate with the completion of early treatment but have been found to have a considerably low quality of life due to the chronically remaining effects of the disability [4]. In addition, their quality of life compared with the general public of the same age is found to be significantly lower [5]. According to the World Health Organization (WHO), the quality of life is the awareness of an individual's position in life in the context of their culture and value systems and in relation to their goals, expectations, standards, and interests. It is a wide ranging concept influenced in a variety of ways in relation to the individual's physical health, psychological state, level of independence, social and environmental relationships [6].

Quality of life refers to state of physical, functional, mental, and social health due to satisfaction, subjective experiences relating to health, as well as mental, social, as well as physical well-being [7]. For many years, quality of life has been defined in various ways. It is social and physical well-being. Most researchers choose various ways to approach estimating quality of life, and putting into effect this four-dimensional approach of including at least the physical, functional, mental, and social well-being is common. The physical aspect mainly inspects health-related symptoms, and the functional aspect includes the ability to perform daily life actions. Mental ability is having the components of cognitive function, emotional state, life satisfaction, and common everyday perceptions relating to health, as well as having social well-being in order to assess social contact and interaction [8].

Because people who have experienced stroke have many cases in which they need to continue with life with the after-effects, there should be an interest in their long-term prognosis and not only in the recovery of their physical abilities but also in the importance of the quality of their continuing life [9]. According to Niemi [10], chronic stroke patients show a decrease in their quality of life four years after the onset of their attack, and stroke not only brings about a decline in the quality of life in the physical, mental, and social dimensions, but also brings about a change in the roles of the patient themselves and, with these changes, has negative impacts on their quality of life [11]. Therefore, it can be seen that the quality of life of stroke patients is a result of complex interactions of many influencing factors. Kim Hyun Cheol [12] reported that the variables that influence the quality of life of stroke patients are depression, daily life activities, monthly income among demographic variables, and Jang gi yun [13]'s study said that the higher the family support, the higher was the quality of life of the stroke patients.

According to Wlodazyk[14] et al., cognitive function is reported to also have a high correlation with health-related quality of life, and by looking Choi Sun Eh [15]'s study, chronic stroke patients' current functional state had a significant relationship with their current health-related quality of life. Also, accompanied diseases, cognitive impairment, depression status, age and marital status had impact on the health-related quality of life. By looking at these previous studies, in the quality of life of stroke patients, depression, daily living skills, income, and family supportt had priority, and there were insufficient studies that looked at the correlation with the stroke patients' cognitive function as the main factor. Therefore, this study examined stoke patients' cognitive abilities and studied the relationship between quality of life with cognitive function as the priority. Also, based on the study results, it was sought to provide basic data for various treatments that would elevate cognitive function in order to improve the quality of life of elderly stroke patients.

2. Method

2.1 Period of Study and Purpose

This study was done from March 1 to 30, 2018. The candidates who were assessed and surveyed were stoke patients over 65 years old who visited the city health rehabilitation clinic in G-city. The selection criteria for the subjects were as follows: among tthose who were at least 65 years of age and diagnosed with stroke, and who understood the purpose of the study and agreed to participate as subjects.

2.2 Materials

2.2.1 Cognitive function assessment tool LOTCA-G

LOTCA-G (Lowenstein Occupational Therapy Cognitive Assessment for Geriatric Population) was used to assess cognitive function. LOTCA-G is a tool developed by Katz et al. [16] that was standardized for stroke patients, patients with brain injury, and normal patients to evaluate basic cognitive abilities. This tool is composed of seven areas including orientation, perception, execution, visual movement organization, thinking, memory, and concentration, and each area's sub-categories consist of twenty-four items in total. The inter-rater reliability tests of the 24 subtests are from 0.82 to 0.97. The reliability of the total test tool is a satisfactory 0.82. LOTCA-G's highest score is 104 and the lowest score is 24. The assessment time requires 20-30 minutes.

2.2.2 Quality of Life Assessment Tool SS-QOL

The tool used in this study is an assessment tool of the stroke patient's quality of life (Stroke Specific Quality of Life, or SS-QOL). This tool was developed by Williams et al. [17], and it was designed to emphasize stroke's particularities that the generally used quality of life assessment tools SF-36, HRQOL and similar measurement tools could not assess. All are composed of 12 sub-items. Those are energy, family, language ability, movement, mood, personality, self-help activities, social roles, thinking, upper extremity function, vision, and work and are in 5-point-scale, with the total scores from a minimum of 49 to the highest of 245, with higher score indicating a higher quality of life. SS-QOL showed an original *a*-worth of .73 or higher. Based on the experimented reports of this country's stroke's patients, the worth of *a* showed as a high 0.80. [18]

3. Procedure

In the inspection process, there were first hand interviews by 1.) occupational therapy majors trained by occupational therapists that understood and knew the methods of using each assessment tool and by 2.) occupational therapists with more than five years of clinical experience. General characteristics of the interview questionnaire, LOTCA-G, SS-QOL were conducted in that order. LOTCA-G has seven domains with a total of twenty-three questions and a required time of 20-25 minutes, and SS-QOL has twelve domains with a total of 49 questions and a required time of about 20 minutes.

4. Analytical Methods

The collected data used SPSS 18.0 for statistical analysis. The study subjects' general characteristics and cognitive function summary score averages were calculated using descriptive statistics. To find out the relationship between cognitive function research tool LOTCA-G and quality of life research tool SS-QOL, the

Pearson correlation was used. The statistical significant value *a* was set to be 0.05.

5. Results

5.1. The General Characteristics of the Study Subjects

Out of the 102 elderly stroke patients, 57 were male, 45 were female, and their average age was 72, with 28 people in the 65-72 age group and 17 people in the 72-85 age group. For the education level of the subjects, with elementary education as the mean, the group with no-education to elementary education had 55 people, and the group with elementary to college education group had 47 people. In marital status, those with a spouse were 67 people and those without a spouse were 35. The study subjects' general characteristics are as the following (Table 1).

Table 1. General Characteristics

Characteristics	Classification	Number of Subjects	Percentage (%)
Sex	Male	57	55.8
	Female	45	44.1
Age	65-72 Years and Under	59	57.8
	72-85 Years and Older	43	42.1
Education Level	Elementary - College	47	46.0
	Uneducated - Elementary	55	53.9
Spouse	Yes	67	65.6
	No	35	34.3

5.2. Cognitive Function Based on General Characteristics

The elderly patients' cognitive ability measured by LOTCA-G had an average of 80.75±12.96 out of a total of 104 points. By gender, men had 79.75±13.65 and women had 77.20±12.27, and by age, the 65-72 years-old group had 79.91±12.41 and the 72-85 years-old age group had 76.25±13.61, and by education level, the elementary to college group had 79.38±13.26 and the non-educated to elementary group had 77.41±12.62. By marital status, those with a spouse had 82.00±15.37 and those without a spouse had 76.05 ± 2.23. Elderly cognitive function of those who used LOTCA-G had differences in the raw scores based on sex, age, education level, and marital status, but showed no statistical significance.

Table 2. Cognitive Function Total Score According to General Characteristics

	Classification	Average	Deviation	t	p
Sex	Male	80.75	13.65	.651	.519
	Female	77.15	12.27		
Age	65-72 Years and Under	80.91	12.41	-.925	.360
	72-85 Years and Older	77.25	13.61		
Educational Level	Elementary - College	79.38	13.26	.507	.615
	Uneducated - Elementary	77.41	12.62		
Spouse	Yes	82.00	15.37	-1.919	.064
	No	76.05	2.23		

*p< 0.05, **p< 0.01

5.3 Quality of Life Based on General Characteristics

The elderly patients quality of life measured by SS-QOL had an average of 142.85±32.2. By gender, men had 141±38.30 and women had 7133±26.19, and by age, the 65-72 years-old group had 139±34.05 and the 72-85 years-old age group had 131±29.17, and by education level, the elementary to college group had 140±36.14 and the non-educated to elementary group had 133±28.28. By marital status, those with a spouse had 159±14.88 and those without a spouse had 125±32.24. Elderly quality of life of those who used SS-QOL had differences in the raw scores based on sex, age, education level, and marital status, but only marital status was statistically significant (p< 0.01).

Table 3. Quality of Life Based on General Characteristics

	Classification	Average	Deviation	t	p
Sex	Male	141	38.30	.806	.426
	Female	143	26.19		
Age	65-72 Years and Under	139	34.05	.714	.480
	72-85 Years and Older	131	29.17		
Educational Level	Elementary - College	140	36.14	-.853	.398
	Uneducated - Elementary	133	28.28		
Spouse	Yes	159	14.88	-4.88**	.000
	No	125	32.24		

*p< 0.05, **p< 0.01

5.4 Correlation between Cognitive Function and Quality of Life

The correlation between cognitive function and quality of life of elderly stroke patients is as follows when analyzed (Chart 5). There was significant correlation between the total scores of LOTCA-G and the total scores of SS-QOL. Out of the total scores of LOTCA-G and the twelve sub-categories of SS-QOL, 10 sub-categories, with the exception of energy and personality, showed significant correlation, with language ability showing the greatest correlation. Energy, one of the sub-categories of SS-QOL, did not show correlation with any of the total scores of LOTCA-G or with the sub-categories.

Table 4. Correlation Between Cognitive Function and Each Element of the Quality of Life

	Orientation	Perception	Execution	Visual Movement	Thinking	Memory	Concentration	LOTCA-G Total Score
Energy	-.043	.096	.028	-.055	.286	.047	-.247	.013
Family	.339*	.422**	.462**	.268	.631**	.381**	.377*	.405**
Language Ability	.828**	.852**	.945**	.842**	.781**	.885**	.849**	.919**
Movement	.218**	.386**	.495**	.335*	.773**	.432**	.417**	.396**
Mood	.255	.279	.526**	.449**	.594**	.457**	.355*	.405**
Personality	.047	.065	.352*	.316**	.484**	.268	.152	.208
Self-Help Activities	.277	.255	.561**	.453**	.829**	.470**	.637**	.431**
Social Roles	.467**	.496**	.694**	.623**	.605**	.646**	.575**	.607**
Thinking	.375*	.258	.609**	.583**	.687**	.546**	.679**	.499**
Upper Extremity Function	.277	.429**	.525**	.456**	.807**	.406**	.311**	.448**
Vision	-.443**	-.193	-.260	-.306*	-.097	-.236	.579**	-.323**
Work	.689**	.690**	.681**	.579**	.447**	.712**	.599**	.703**
SS-QOL Total Score	.441**	.519**	.717**	.589**	.847*	.638**	.588**	.611**

*p< 0.05, **p< 0.01

6. Discussion

Elderly stroke patients live the rest of their lives with many difficulties due to manifold neurological damages. However, in most cases, elderly stroke patients with chronic disease and disability have a lowered quality of life due to cognitive impairment and physical problems. In this study, through research of elderly

stroke patients' cognitive function and quality of life, it was sought to provide basic data for cognitive enhancement in order to improve the quality of life of elderly stroke patients. This study targeted elderly stroke patients using LOTCA-G and SS-QOL to assess their cognitive function and quality of life and to find out the correlation between their cognitive function and quality of life. The subjects of study were elderly patients diagnosed with stroke who were visiting the rehabilitation clinic at a particular local public health center. Looking at the tools used in this study, LOTCA-G was used in order to find out the elderly patients' cognitive function. This tool was developed to make it possible to assess the elderly patients' cognitive function and was used because it was understood to be a tool that could divide the elderly patients' cognitive function into different areas and distinguish them. When carefully observing the subjects, assessment tools, and measurement methods used by previous studies related to elderly stroke patients' quality of life, Pyun Sung Bum et al. [19] used Quality of Life Index (QLI). According to Moon Jung In [20], SS-QOL, the research tool used in this study, has been newly adapted and showed high reliability, and was used because it was a quality of life assessment tool fitting with our cultural and social environment.In looking at this study subjects' cognitive function and quality of life based on their general characteristics, there were differences in the raw scores depending on the elderly stroke patients' sex, age, education level, and marital status. When looking at previous research on cognitive function of elderly patients who used LOTCA-G, Cha yoo Jin [21] reported that when comparing stroke patients' clinical group with a normal elderly group, the group with a lower age had higher scores, and Jang gi yun et al. [22] had results that said that men have high cognitive function than women with higher education and lower age, and this is in agreement with this study. There were differences in the raw scores of the elderly stroke patients' quality of life based on sex, age, education level, and marital status. These results agreed with studies that showed the differences in elderly stroke patients' quality of life based upon sex, age, economic status, and so on, but male stroke patients had higher quality of life than female patients, and stroke patients with a lower age had higher quality of life [23].In this study, after analysis, the results showed a high relationship between elderly stroke patients' cognitive function and quality of life ($p<0.01$). This result is equivalent to the result that says that cognitive function has a high correlation with quality of life [24]. Although the subjects are different, in researching the quality of life of disabled persons according to the type of disability, the following study results also support this: the fact that those with the most favorable cognitive function--the visually disabled--showed to have the highest quality of life, and those with the lowest cognitive function--the mentally disabled--showed to have the lowest quality of life [25]. When looking at the study that targeted the elderly with cognitive functional disability, IADL, which needs an even higher level of problem solving skills and cognitive ability for quality of life, had an even higher relationship with BADL, and it was possible to know that there was a correlation between quality of life and all the areas of cognitive function [26]. By looking closely, it was found that the better the cognitive function, the higher than quality of life. By looking at the other studies, When looking at other research, various studies have reported about depression, daily life activities [27], monthly income and family support [28], which are factors that impact life satisfaction and quality of life. However, it was realized that there were not many studies that looked at the relationship of quality of life with cognitive function as priority. In this study, there is significance in investigating cognitive function of elderly stroke patients as the main factor in its relationship with quality of life. When looking at the limitations of this study, only one assessment tool was used to research the cognitive function of elderly stroke patients, and it is difficult to generalize this relationship to quality of life because the number of subjects was small. Therefore, in order to further study the relationship between cognitive function and quality of life of elderly stroke patients, it is necessary to research by using many types of cognitive function assessment tools and by increasing the number of study subjects.

7. Conclusion

The purpose of this study was to use LOTCA-G and SS-QOL to assess cognitive function and quality of life of elderly stroke patients and to find out the relationship between elderly stroke patients' cognitive function and quality of life. The research period was from March 1 to March 30, 2018, and the subjects of study were 102 elderly stroke patients who visited a city health rehabilitation clinic located in G-city. In looking at the

results of this study, cognitive function of elderly stroke patients had differences in the raw scores based on sex, age, education level, and marital status, but showed no statistical significance, and quality of life of elderly stroke patients had differences in the raw scores based on sex, age, education level, and marital status, but only marital status was statistically significant ($p< 0.01$). Cognitive function and quality of life of elderly stroke patients showed a statistical significant correlation. There was significant correlation between LOTCA-G and SS-QOL sub-categories, but energy, which is among one of the sub-categories of quality of life, did not have significant correlation with any of the sub-categories of cognitive function.When putting the study results together, it can be known that elderly stroke patients' cognitive function and quality of life show a high correlation when LOTCA-G and SS-QOL were used. Based on the results of this study, it was sought to provide basic data for various treatments that would elevate cognitive function in order to improve the quality of life of elderly stroke patients. Also, it is proposed that research be conducted using a even greater variety of cognitive function assessment tools to find out more about the relationship between cognitive function and quality of life of elderly stroke patients.

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