Original Article

The relationship between stroke patients' socio-economic conditions and their quality of life: the 2010 Korean community health survey

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Abstract. [Purpose] The relationship between stroke patients' socio-economic conditions and quality of life (QOL) using the 2010 Korean Community Health Survey (KCHS) statistics was examined. [Subjects and Methods] A total of 4,604 stroke patients were analyzed. Socio-economic conditions were sex, age, educational level, monthly household income, occupation, residential area, and living with family. [Results] The results show a statistically significant lower QOL for men than for women, for those aged 75 years or over compared to individuals between 19 years and 64 years, and for elementary (or lower) or middle school graduates compared to higher education graduates. QOL was also significant lower among patients whose household income was KRW4 million (US$3,746.72) or less a month. Finally, QOL was significantly lower for patients without an occupation compared to those with an occupation, for patients in rural areas compared to urban areas, and for patients who did not live with family compared to those who lived with family. [Conclusion] We showed the importance of the relationships between socio-economic conditions and QOL of stroke patient.
Key words: Stroke, Quality of life, Korean Community Healthy Survey

INTRODUCTION

A stroke is the loss of neurological functions due to a blockage in the blood supply to the brain and is the most common cause of disability for adults[1]. According to Statistics Korea (2012), the three most frequent causes of death among Korean people were malignant neoplasm (cancer), cardiovascular disease, and cerebrovascular disease[2].

Due to advancements in medical technology, the number of deaths from stroke has fallen. However, many stroke patients are left with severe disabilities, including hemiplegia, language impairment, communication disorders, cognitive impairment, and emotional disorders. Due to these post-stroke disabilities, patients undergo long-term rehabilitation, such as physical therapy, occupational therapy, and speech therapy, which puts a heavy psychological and financial burden on the patients and their families[3, 4].

Disabilities also include facial nerve palsy, sensory disorder, and gait abnormality. As a result, it becomes hard for stroke victims to manage activities of daily living independently, and achieving independence in the functional movements of daily living is a critical element in stroke patients' quality of life (QOL)[5]. Rehabilitation programs offer those with disability after stroke the aim of QOL[6]. A stroke damages the upper motor neurons and restricts the functional use of both hands in daily activities, such as putting on clothes, eating meals, and engaging in sports activities[7].

The absence of disease or disability has traditionally been regarded as a healthy state. However, as society grows increasingly more complex and diverse, the state of maintaining a stable condition in various dimensions, including physical, psychological, and social, has come to be regarded as good health. In other words, greater attention is being paid to QOL[8]. Since stroke patients cannot recover in the short term and have to struggle with chronic disability and participate in rehabilitation over the long term, socio-psychological issues, such as depression from physical disorders and deteriorating QOL, are common[9, 10]. Most stroke patients' social roles change as their autonomy is lessened due to their inability to perform daily activities, and they face the issue of socio-psychological maladaptation in interpersonal relationships, which leads to a decline in patients' subjective assessment of their QOL[11].

After a stroke, QOL from the physical perspective has a direct bearing on the measurement of a patient's recovery[12]. However, post-stroke disabilities create physical problems

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and financial burdens[13]. To enhance stroke patients' QOL, it is necessary to assess their QOL and analyze factors that reduce it; however, currently society pays little attention and gives little support to this need[14]. Therefore, the Korea Centers for Disease Control and Prevention introduced the Korean Community Health Survey (KCHS) to analyze and evaluate regional health and medical planning using a standardized survey[15].

Previous studies in this area have suggested a relationship between stroke patients' QOL and their social and economic conditions, such as depression, movements in daily living, and monthly income. In this study, we examined the relationship between stroke patients' socio-economic conditions and QOL based on 2010 KCHS statistics.

SUBJECTS AND METHODS

Subjects

This study utilized raw data from the 2010 KCHS that was collected during the period between August 16 and October 31, 2010. Researchers visited households selected for the survey and conducted a 1:1 interview, recording the responses on a laptop computer. Households were selected based on samples retrieved from the national address data of the Ministry of Security and Public Administration and data on housing types and number of households from the Ministry of Land, Infrastructure, and Transport. Nine hundred people on average were surveyed in each area covered by a public health center. To conduct the survey, an operational committee, special subcommittees, and a secretariat were formed with cooperation from the Korea Centers for Disease Control and Prevention, 16 cities and provinces, 253 public health centers, and 36 universities[16, 17].

For the 2010 survey, 229,229 subjects participated. After omitting 93 subjects whose diagnosis of stroke could not be verified, 229,136 stroke patients remained, and the final analysis was done on 4,604. A profile of the subjects' socio-economic conditions is shown in Table 1.

Methods

To examine the relationship between stroke patients' socio-economic conditions and QOL, the following variables were identified: sex, age, educational level, monthly household income, occupation, residential area, and living with family. Age groups were divided into 19 through 64 years, 65 through 75 years, and 75 years and older. For educational level, subjects were grouped based on their level of completion: elementary school graduates (or lower), middle school graduates, and higher education graduates (or higher). Monthly household income was reported as the monthly wage, and income groups were divided into KRW1 million and less, over KRW1 million but under KRW2 million, over KRW2 million but under KRW3 million, over KRW3 million but under KRW4 million, and over KRW4 million. The participants were deemed to have a job if they were engaged in economic activities to earn money at the time of the survey. Participants were considered urban residents if their address was in Dong, whereas they were considered rural if their address was in Eup or Myeon. The participants were deemed to live with family if they indicated so in the survey.

Table 1. Characteristics of the subjects

Characteristics	n*	%†	%SE
Total stroke patients			
Yes	4,604	1.4	0.0
No	224,532	98.6	0.0
Sex			
Male	2,308	51.6	0.6
Female	2,296	48.4	0.6
Age (years)			
19–64	1,282	35.5	0.6
65–74	1,950	38.1	0.6
≥75	1,372	26.4	0.5
Educational level			
Elementary school or less	3,009	55.6	0.6
Middle school	581	14.8	0.4
High school and over	1,003	29.7	0.6
Monthly household income (10,000 won)			
≤100	2,461	48.4	0.6
101–200	815	22.6	0.6
201–300	427	12.6	0.5
301–400	83	2.3	0.2
≥401	386	14.0	0.5
Occupation			
Yes	1,072	21.3	0.5
No	3,201	78.7	0.5
Residential area			
Urban	1,983	72.3	0.2
Rural	2,621	27.7	0.2
Living with family			
Yes	3,893	87.1	0.4
No (alone)	711	12.9	0.4

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

To measure QOL, the EQ-5D was used, which is an assessment tool developed by the EuroQol Group established in 1987. Participants were asked for responses in five areas-mobility, self-care, usual activity, pain/discomfort, anxiety/depression-on a three-point Likert scale (without difficulty, slightly difficult, very difficult). The results were processed using the formula below.

$$EQ\text{-}5D = 1 - (0.05 + 0.096*M2 + 0.418*M3 + 0.046*SC2 + 0.136*SC3 + 0.051*UA2 + 0.208*UA3 + 0.037*PD2 + 0.151*PD3 + 0.043*AD2 + 0.158*AD3 + 0.05*N3)$$

The protocol of the KCHS was reviewed and approved by the institutional review board of the Korean Centers for Disease Control and Prevention (2010-02CON-22-P). Written informed consent was obtained from all participants in the KCHS.

The collected data were analyzed using IBM SPSS Statistics 21.0. In consideration of the complex sampling design, individual weights were applied for estimation of the entire population. Frequency analysis was done to examine the distribution of participants. To examine the relationship between stroke patients' socio-economic conditions and

Table 2. The relationship between stroke patients' socio-economic conditions and their quality of life

	B	SE
Sex (/Female)		
Male	−0.021	0.008*
Age (years) (/19–64)		
65–74	−0.015	0.008
≥75	−0.083	0.010*
Educational level (/High school and over)		
Elementary school or less	−0.055	0.009*
Middle school	−0.042	0.013*
Monthly household income (10,000 won) (/401≤)		
≤100	−0.051	0.013*
101–200	−0.026	0.013*
201–300	−0.038	0.014*
301–400	−0.115	0.017*
Occupation (/Yes)		
No	−0.184	0.006*
Residential area (/Urban)		
Rural	−0.017	0.007*
Living with family (/Yes)		
No (alone)	−0.023	0.010*

R^2=0.137, *Adjusted for sex, age, educational level, monthly household income, occupation, residential area, living with family

QOL, a multiple linear regression analysis was undertaken while controlling for variables of sex, age, educational level, monthly household income, occupation, residential area, and living with family. The level of significance was chosen as, $\alpha = 0.05$.

RESULTS

The results of the multiple linear regression analysis show that QOL was significantly lower for men than for women (B = −0.021, p = 0.007), and for patients aged 75 or over than for patients aged between 19 and 64 (B = −0.083, p < 0.001). QOL was significantly lower for elementary school graduates (or lower) (B = −0.055, p < 0.001) or middle school graduates (B = −0.042, p = 0.001) than for higher education graduates. QOL was also significantly lower for patients whose household income was KRW1 million or less a month (B = −0.051, p < 0.001), over KRW1 million but under KRW2 million (B = −0.026, p = 0.048), over KRW2 million but under KRW3 million (B = −0.038, p = 0.009), and over KRW3 million but under KRW4 million (B = −0.115, p < 0.001) compared to those with incomes over KRW4 million. Finally, QOL was significantly lower for patients without an occupation compared to those with an occupation (B = −0.184, p < 0.001), for patients living in rural areas compared to those living in urban areas (B = −0.017, p = 0.011), and for patients who did not live with family compared to those who lived with family (B = −0.023, p = 0.024) (Table 2).

DISCUSSION

This study attempted to identify the relationship between stroke patients' socio-economic conditions and QOL to provide basic data to local communities for the rehabilitation of stroke patients. We examined the socio-economic variables of sex, age, educational level, monthly household income, occupation, residential area, and living with family.

This study showed a lower QOL among male patients than among female patients. In the study of Petrea et al., female patients showed a lower QOL than male patients, but the difference was not statistically significant level[18]. The discrepancy in research methodology may explain the difference between results. In our study, the 4,604 stroke patients were aged 19 through 75 and included a similar number of male (2,308) and female (2,296) patients. However Petrea et al.[18] examined fewer patients (1,136) in an older age range (56 through 85 years) consisting of more female patients (638) than male patients (498).

QOL was also significantly lower for patients aged 75 years or older than for those aged between 19 and 64. In another study that compared stroke patients and non-stroke patients in terms of gender, age, and income, stroke patients showed significantly worse QOL measures than controls[19]. It can be interpreted from this that stroke patients' QOL by age has a significantly lower impact on patients' depression.

Stroke patients' QOL by educational level was significantly lower for elementary (or lower) and middle school graduates than for stroke patients with higher levels of education. In agreement with our study, previous studies have reported that a higher educational level results in a better QOL[20, 21].

Stroke patients' QOL by monthly household income was significantly lower among patients whose monthly income was KRW4 million or less compared to those who earned more. In previous research, socio-demographic variables found to affect stroke patients' QOL include depression, movements in daily life, and monthly income[22]. Therefore, financial factors can be as important as physical condition and functional elements in the factors influencing stroke patients' QOL. Government-provided pension benefits for stroke patients based on income level may help to mitigate depression arising from a sense of marginalization in society, and enhance stroke victims' QOL.

Stroke patients' QOL by occupation showed that patients without an occupation had a lower QOL than patients with an occupation. This is in agreement with previous research that showed that stroke patients' QOL was higher when they had an occupation and were in a financially better condition[23, 24], and suggests that a post-stroke return to work helps lead to a recovery of physical functions, increased sense of achievement, and less depression. Since it is hard for stroke patients to fully recover physical functions, and because a stroke is accompanied by disabilities and disorders, patients might experience a loss of self-esteem when returning to their previous jobs. Thus, when rehabilitating stroke patients, physical function and psychological aspects should be regarded as important.

Patients in rural areas were found to have a lower QOL than patients in urban areas. There are a number of possible

reasons for this. First, housing and economic conditions between urban and rural areas differ. Second, the two areas have different health issues as a result of the different services provided and for geographic reasons[25]. People living in rural areas might form looser bonds with family due to limited transportation and travel difficulties. Therefore, a lower ability to execute daily activities could affect stroke patients' QOL, and more research should be done on the significance of a patient's location.

Stroke patients' QOL based on living arrangements showed that patients who lived alone had a lower QOL than those living with family. Stroke survivors who live alone are at greater risk of increased depressive symptoms[19]. Another study showed that stroke patients showed high enthusiasm and voluntary participation in cognitive behavior-related group counseling programs with their spouses, and this program triggered strong motivation in patients' commitment to rehabilitation and had a positive impact on enhancing QOL of both stroke patients and their families[9]. It should be noted that in rehabilitating stroke patients, families (in the same household) could have a significant influence; the role of the spouse is particularly important. This suggests that more treatment opportunities are needed for stroke patients without families and for spouses that live with stroke patients.

One limitation of this study is that data accuracy could not be maximized through data segmentation. The KCHS data were used instead of data collected exclusively for the purposes of analyzing stroke and QOL. However, previous research has shown that patients with higher QOL were more motivated in rehabilitation. Therefore, functional rehabilitation that enables independent daily living is needed to improve stroke patients' QOL and actively life[11, 20]. The statistically significant relationship between the socio-economic conditions identified in this study (sex, age, educational level, monthly household income, occupation, residential area, living with family) and stroke patients' QOL is notable. Therefore, it is important to set up a more comprehensive plan for the rehabilitation of stroke patients that takes into account improvement in bodily functions and socio-economic variables in order to effectively enhance their QOL.

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