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Determinant of Quality of Life in Patients with Chronic Cerebral Infarct

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Correspondence to
Tae-Woo Kim
Department of Rehabilitation Medicine, National Traffic Injury Rehabilitation Hospital, 260 Jungang-ro, Yangpyeong-eup, Yangpyeong 12564, Korea.
E-mail: taewookimmd@gmail.com

Seong Hoon Lim
Department of Rehabilitation Medicine, St. Vincent's Hospital, College of Medicine, The Catholic University of Korea, 93 Jungbu-daero, Paldal-gu, Suwon 16247, Korea.
E-mail: seonghoon@catholic.ac.kr

HIGHLIGHTS

- The health-related quality of life (HRQoL) is important domain for treatment of stroke.
- The physical disability was negatively correlated with HRQoL.
- Severity of physical disability was associated with physical health and bodily pain.

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Determinant of Quality of Life in Patients with Chronic Cerebral Infarct

Yujin Lee,[1] **Joon Sung Kim**,[2] **Bo Young Hong**,[2] **Jung Geun Park**,[2] **Jae Wan Yoo**,[2] **Kyoung Bo Lee**,[2] **Tae-Woo Kim**,[3] **Seong Hoon Lim**[2]

[1]Bloomberg school of Public Health, Johns Hopkins University, Baltimore, MD, USA
[2]Department of Rehabilitation Medicine, St. Vincent's Hospital, College of Medicine, The Catholic University of Korea, Seoul, Korea
[3]Department of Rehabilitation Medicine, National Traffic Injury Rehabilitation Hospital, Yangpyeong, Korea

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Correspondence to
Tae-Woo Kim
Department of Rehabilitation Medicine, National Traffic Injury Rehabilitation Hospital, 260 Jungang-ro, Yangpyeong-eup, Yangpyeong 12564, Korea.
E-mail: taewookimmd@gmail.com

Seong Hoon Lim
Department of Rehabilitation Medicine, St. Vincent's Hospital, College of Medicine, The Catholic University of Korea, 93 Jungbu-daero, Paldal-gu, Suwon 16247, Korea.
E-mail: seonghoon@catholic.ac.kr

ORCID iDs
Yujin Lee
https://orcid.org/0000-0002-9983-0906
Joon Sung Kim
https://orcid.org/0000-0001-7457-593X
Bo Young Hong
https://orcid.org/0000-0001-9290-6173
Jung Geun Park
https://orcid.org/0000-0002-9298-9850
Jae Wan Yoo
https://orcid.org/0000-0002-4682-5716

ABSTRACT

This study investigated how physical and cognitive function and psychological factors affected the health-related quality of life (HRQoL, hereafter HQ) of stroke patients in South Korea. The study enrolled 32 right-handed subjects with chronic cerebral infarction with disability and preserved cognitive function (Mini-Mental State Examination ≥ 20). Physical disability was assessed using the modified Rankin Scale (mRS) and Korean modified Barthel Index (KMBI). Quality of life was measured using the World Health Organization Quality of Life-Abbreviated form (WHOQOL-BREF, hereafter WB) and the 36-Item Short-form Health Survey (SF-36) in face-to-face interviews. Psychological distress was investigated using the Beck Depression Inventory Scale-II. The associations of each domain of WB and SF-36 were investigated using Pearson correlation analyses. Physical disability was negatively correlated with HQ in the SF-36. The physical function and bodily pain scales of the SF-36 were negatively correlated with physical disability. The general health domain of the SF-36 was negatively correlated with psychological scores. Emotional status was associated with physical health, social relationships, and general health in HQ. In summary, the severity of physical disability was associated with the patient's general and physical health and body pain. These findings suggest the importance of psychological, cognitive, and physiological interventions for improving the quality of life of patients after cerebral infarction.

Keywords: Stroke; Cerebral infarction; Quality of life; WHOQOL-BREF; SF-36

INTRODUCTION

The mortality of stroke has decreased with technological developments in its treatment, although the incidence of stroke has increased [1]. Nevertheless, about half of stroke survivors have imperfect recovery and half of these need assistance with activities of daily living (ADLs) [2]. The recovery of motor function and restoration of ADLs are important outcomes in stroke patients [3]. After the acute medical management, there is a large cost burden involved in managing the rehabilitation, long-term nursing, and employment of such patients. The World Health Organization (WHO)–Global Burden of Disease reports that neurological diseases have a greater cost burden than gastrointestinal and respiratory diseases and malignant tumors combined [4]. In addition to the physical and economic

Kyoung Bo Lee
https://orcid.org/0000-0002-7652-1393
Tae-Woo Kim
https://orcid.org/0000-0003-4017-549X
Seong Hoon Lim
https://orcid.org/0000-0002-5475-4153

Conflict of Interest
The authors have no potential conflicts of interest to disclose.

burdens, emotional and social difficulties might worsen the quality of life (QOL) in patients with stroke.

To increase the overall QOL and social participation, multiple domains must be assessed. Stroke patients should return to their ordinary lives through rapid functional restoration, while upgrading their health-related quality of life (HRQoL, hereafter HQ). The WHO defines QOL as 'an individual's perception of their position in life in the context of the culture and value systems in which they live, and in relation to their goals, expectations, standards and concerns' [5]. Stroke decreases HQ by causing various disorders, including exercise, language, cognition, and psychological impairment. Therefore, these patients require combined medical and HQ assessments. Most patients have a decrease in their HQ after a stroke. Depression and old age are related to the low HQ [6,7]. Other factors related to HQ include inadequate functional restoration in their daily lives, insufficient social and emotional support, isolation from community members, and sex [4]. In developed countries, the deterioration in patients' daily lives due to cardiovascular diseases exceeds that due to stroke, while in Korea stroke has a significantly greater effect than cardiovascular diseases [6,8]. However, few studies have examined HQ among stroke patients in Korea.

Therefore, we assessed the demographics, physical and cognitive functions, and psychological status of patients with chronic cerebral infarction as well as the correlation between each item and HQ.

MATERIALS AND METHODS

Study design and participants

This prospective study recruited 32 right-handed subjects with chronic cerebral infarct, more than 3 months after stroke onset from a rehabilitation clinic in 2013. All subjects had suffered supratentorial strokes and met the following criteria: first unilateral stroke, able to follow verbal instructions, and modified Rankin Scale (mRS) ≥ 1 at 3 months after stroke onset. Exclusion criteria were cognitive dysfunction defined by a Mini-Mental State Examination (MMSE) score < 20, the presence of other life-threatening diseases such as cancer, a history of chronic obstructive pulmonary disease, and a history of inflammatory arthritis, inflammatory myopathy, or other systemic disease.

Patients with an MMSE score < 20 points were excluded because they might not be able to describe their own QOL precisely due to impaired recognition.

Because this was a survey study with no harm or risk to the participants, an exact sample size was not calculated beforehand. We decided on a sample size of at least 30 subjects for analyses. The study protocol was reviewed and approved by the Institutional Review Board of the Catholic University and informed consent was obtained from all participants (VC13QISI0008).

Assessment

The age, sex, marital status, education background, religion, and body mass index (BMI) of the subjects were recorded and the severity of physical disability was measured using the Korean modified Barthel Index (KMBI) and mRS [9,10].

HQ was measured using the Medical Outcomes Study Short Form-36 (SF-36) and World Health Organization Quality of Life-Abbreviated form (WHOQOL-BREF, hereafter WB) as generic measures [4,5,11,12]. The SF-36 is a 36-item assessment tool that measures 8 general health concepts assessing the physical and mental status of the patients (physical, role-physical, bodily pain, general health, vitality, social functioning, role emotional, and mental health). The physical and mental composite scores summarize the eight health concepts into two groups with a range from 0 to 100, where a higher score reflects a higher HQ [4,13]. The WB measures HQ using 26 questions to assess four domains (physical factors, psychological factors, social relationships, and environmental context) and the raw subscale score is adjusted to 0–100 points to compare with other data. A higher WB score indicates a higher HQ [5,12]. The degree of depression in patients was measured using the Beck Depression Index scale-II (BDI-II, Korea Psychology, Daegu, Korea). The original BDI consists of 21 questions and each question is scored according to the degree of depression using 0 point for 'I do not feel sad,' 1 point for 'I feel sad,' 2 points for 'I am sad all of the time and I can't snap out of it,' and 3 points for 'I am so sad or unhappy that I can't stand it.' The depression level is based on the total score and rated as minimal (0–13), mild (20–28), and severe (29–63) [14].

The MMSE, SF-36, WB, and BDI-II were assessed in interviews with the patients or their guardians and the KMBI and mRS were measured using the researcher's observations. The results were explained to the patient and counseling was provided if required.

Statistical analysis

The correlations between HQ and sociodemographic data, cognitive function, physical disability, and depressive mode were assessed using Pearson correlation analyses. The Pearson correlation is considered weak for scores < 0.30, mild between 0.30 and 0.59, and strong for ≥ 0.60. The p values < 0.05 were deemed significant. All statistical analyses were performed using SPSS for Windows (ver. 21.0; SPSS, Chicago, IL, USA).

RESULTS

The study enrolled 35 patients (16 females), but 3 were excluded due to insufficient answers. The average patient age (mean ± standard deviation) was 54.4 ± 10.8 (range, 28–75) years. Table 1 summarizes their demographic and clinical characteristics. The average MMSE, a

Table 1. Demographic and clinical data of the participants

Characteristics	Distribution in sample (n = 32)
Demographic characteristics	
Age (yr)	54.4 ± 10.8 (28–75)
Sex (female:male)	15:17 (46.9%)
Education (yr)	10.2 ± 2.7 (6–16)
Marital status (unmarried:married)	7:25
Religion (no:yes)	16:16 (50.0%)
BMI (kg/m^2)	23.7 ± 4.0 (16.6–33.2)
Clinical characteristics	
Time from cerebral infarction (mon)	6.3 ± 1.6 (3–10)
KMBI	61 ± 25.4 (6–100)
mRS	3.3 ± 0.8 (1–5)
MMSE	25.9 ± 2.92 (20–30)
BDI	14.8 ± 11.8 (0–42)

Data shown are mean ± standard deviation (range) not otherwise specified.
BMI, body mass index; KMBI, Korean modified Barthel Index; MMSE, Mini-Mental State Examination; BDI, Beck Depression Index.

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measure of cognitive ability, was 25.9 ± 2.92 (range, 20–30), and the average KMBI, a measure of physical disability, was 3.3 ± 0.8 (range, 1–5). The average BDI-II, a measure of depression, was 14.8 ± 11.8 (range, 0–42).

The WB was significantly negative correlated with BMI and social relationships (Table 2). There was no significant correlation between cognitive function and HQ. The SF-36 scores for the physical function and bodily pain scales were negatively correlated with the mRS and positively correlated with the KMBI (Table 3). The SF-36 physical composite score was also negatively related to the mRS and positively related to the KMBI (Table 4). There was no significant correlation between the WB domain and physical disability. The BDI-II and general health scale of SF-36 were negatively correlated (Table 5). Environmental context and depressive mood were negatively correlated in the WB (Table 6).

DISCUSSION

Most of the results of the comparisons between HQ and the sociodemographic characteristics of the stroke patients were negative, although mild positive correlations were found with the social relationship scale of the WB and the patient's BMI, personal relationships, and social support. This suggests that stroke patients with a higher BMI have

Table 2. Correlation between demographic characteristics and WHOQOL-BREF

Characteristics	Physical factor	Psychological factors	Social relationships	Environmental context
BMI	0.185 (0.312)	−0.004 (0.984)	0.420 (0.017)	0.167 (0.362)
Marital status	−0.285 (0.117)	−0.030 (0.872)	0.339 (0.058)	0.290 (0.107)
Education	0.037 (0.843)	0.058 (0.752)	−0.061 (0.742)	−0.019 (0.916)

Values were correlation coefficient (p value).
WHOQOL-BREF, World Health Organization Quality of Life-Abbreviated form; BMI, body mass index.

Table 3. Correlation between physical function and SF-36

Scale	Physical function	Role-physical	Bodily pain	General health	Vitality	Social function	Role-emotional	Mental health
mRS	−0.374 (0.035)	−0.305 (0.090)	−0.399 (0.024)	−0.013 (0.943)	0.024 (0.898)	−0.153 (0.403)	−0.249 (0.169)	−0.084 (0.646)
MBI	0.591 (< 0.001)	0.336 (0.060)	0.321 (0.073)	−0.112 (0.543)	0.008 (0.966)	−0.003 (0.985)	0.018 (0.924)	−0.096 (0.600)

Values were correlation coefficient (p value).
SF-36, Medical Outcomes Study Short Form-36; mRS, modified Rankin Scale; MBI, Modified Bathel Index.

Table 4. Correlation between physical function and SF-36 summary measurement

Scale	Physical composite score	Mental composite score
mRS	−0.455 (0.009)	−0.007 (0.968)
MBI	0.598 (< 0.001)	−0.303 (0.092)

Values were correlation coefficient (p value).
SF-36, Medical Outcomes Study Short Form-36; mRS, modified Rankin Scale; MBI, Modified Bathel Index.

Table 5. Correlation between depressive mood and SF-36

Scale	Physical function	Role-physical	Bodily pain	General health	Vitality	Social function	Role-emotional	Mental health
BDI-II	−0.287 (0.111)	−0.200 (0.272)	0.007 (0.970)	−0.625 (< 0.001)	−0.075 (0.685)	−0.295 (0.101)	−0.106 (0.564)	−0.278 (0.123)

Values were correlation coefficient (p value).
SF-36, Medical Outcomes Study Short Form-36; BDI-II, Beck Depression Index scale-II.

Table 6. Correlation between depressive mood and WHOQOL-BREF

Scale	Physical factor	Psychological factors	Social relationships	Environmental context
BDI-II	−0.467 (0.007)	−0.249 (0.169)	−0.371 (0.037)	−0.500 (0.004)

Values were correlation coefficient (p value).
WHOQOL-BREF, World Health Organization Quality of Life-Abbreviated form; BDI-II, Beck Depression Index scale-II.

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difficulty forming social relationships. We found negative correlations between the daily activities, climbing, and walking and the bodily pain scale of the SF-36. Greater physical disability means more difficulty in the daily lives of stroke patients and the patients are more exposed or sensitive to pain. Conversely, physical disability was not closely related to mental health, including social function or emotion in HQ. Comparing depressive mood and HQ of the stroke patients, a weak negative correlation was found between the social relationship and physical health scales of the WB, including general health, ADLs, mobility, and pain and discomfort of the SF-36, which scores subjective health and depressive mood.

Previous research showed that post-stroke depression decreased the functional status or activities of patients with stroke [15,16]. Combined with our results, physical activity may affect the emotional status of stroke patients and vice versa. Another report showed that a higher pre- and post-stroke QOL is associated with better social determinants of health in lower and middle-income countries [17]. Contrasting a previous study, we found that social determinants did not have a major role in HQ in chronic stroke patients; this may result from different incomes in different nations or different stages of the disease (acute versus chronic) [17]. One prospective cohort study showed that the self-perceived HQ deteriorated significantly at 12 months in terms of social interactions and living environment [18]. Depression had a negative association with all four domains of HQ, whereas decreasing disability in the basic ADLs (reflected by an increasing Barthel Index score) had a positive association with the physical and psychological HQ [18]. Another study found that the severity of anxiety symptoms in stroke is independent of sex and depressive symptoms and is associated with a poor stroke-related HQ [19]. We found that depressive mood affected HQ and social relationship scale, and caused more difficulties with the ADLs. Overall, emotion such as depression or anxiety may significantly affect the stroke-related HQ [20]. This means that a severe depressive mood increases the probability that patients consider their health status bad, which causes more difficulty with their ADLs, relationships with others, or performing their own roles in society. We did not find a correlation between cognitive function and HQ. This has several possible explanations. Those with disability after stroke usually may not have tried to find jobs, which were already blocked by social barriers. In addition, the inclusion criterion MMSE ≥ 20 could have masked the social barriers caused by low cognition. Finally, cognition may truly not be correlated with HQ.

Our study had 2 major limitations. First, the small sample size may limit the interpretation of our findings. Because this study was a small investigation, several methods were used to overcome biases. For example, only patients with cerebral infarction due to supratentorial lesions and mRS > 1 were included. Second, this was a cross-sectional study, which can identify only correlations and not causative or confounding factors. Further longitudinal, large-scale studies are needed to answer the remaining questions.

CONCLUSION

In conclusion, an understanding of the relationships among HQ, disability, and post-stroke depression is required to plan the appropriate rehabilitation of stroke patients. We investigated the relationships between specific items of the generic HQ, sociodemographic characteristics, physical disability, cognitive function, and depression. When planning rehabilitation treatment for stroke patients, physiatrists should consider that improving the physical disability and treating any depression may improve HQ.

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