Geriatric Rehabilitation 2022;12(2):76-82

Original Article

Factors Affecting Stress in Chronic Stroke Patients Undergoing Rehabilitation

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만성 뇌졸중 환자의 스트레스에 미치는 인자

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Abstract

Objective: This study evaluated the stress level of chronic stroke patients and its associations with factors such as neuropathic pain, sleep disorder, and socioeconomic status were quantified.

Method: Thirty chronic stroke patients aged 18 years and above who were undergoing rehabilitation were included in the study. The Adult Self-Report (K-ASR) was used to evaluate stress levels in these patients.

Results: The mean K-ASR t scores were in the normal range, and only three patients (10%) had scores in the clinical range. Stress levels as indicated by the K-ASR were related to annual income (rho = -0.391, p = 0.033), neuropathic pain (rho = 0.457, p = 0.011), and sleep disorder (rho = 0.188, p = 0.041).

Conclusion: Overall stress levels of chronic stroke patients were not high compared to those of the general population. In addition, we found that stress levels were strongly and significantly associated with neuropathic pain, annual income, and sleep disorder.

Key Words

Chronic stroke, K-ASR, Stress, Neuropathic pain, Annual income

Received : January 13, 2022
Accepted : June 10, 2022
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Introduction

Despite medical advances in treating acute stroke, several patients experience sequelae.[1] In addition to increased life expectancy, it is important to address psychiatric problems and quality of life issues.[2-4] Especially in stroke patients, although several studies have focused on post-stroke depression (PSD), stress has been less explored.[5,6] PSD is common in stroke patients and contributes to greater disability and increased mortality.[7] Therefore, numerous studies have focused on this issue recently, and several therapeutics have been developed to manage PSD.[8,9]

Stress in chronic stroke patients may be induced by several factors. These patients not only suffer from various disabilities, including motor function disorder, language disorder, and cognitive disorder, but they also

have other complications that can make their daily lives uncomfortable.[10,11] Previously, studies have explored mood disorders in stroke patients. However, these studies did not include any stress indicators.[12,13]

Complications in chronic stroke patients include spasticity, mood disorder, cognitive disorder, dysphagia, sleep disorder, and musculoskeletal pain. Muscle spasticity is a common problem in patients with neurologic injury and can lead to radical changes in functional ability and quality of life.[14] Spasticity is one of the most important factors associated with pain as well as discomfort in daily life. Therefore, uncontrolled spasticity is likely to affect stress levels in chronic stroke patients. Similarly, neuropathic pain, bowel and bladder problems, and sleep disorders might affect stress in patients. From a different perspective, the socioeconomic status of chronic stroke patients may also affect stress levels.

Therefore, we aimed to investigate stress levels in chronic stroke patients and identify the associated factors.

Materials and Methods

1) Study design and participants

This was a prospective study conducted on chronic stroke patients who visited the outpatient clinic at the Division of Rehabilitation, Department of Rehabilitation Medicine, Asan Medical Center, between 2016 and 2018. Patients with a minimum of 6 months as the period after the occurrence of the disease event were included in the study. Patients who did not agree to participate in the study or who could not score at least 25 on the Mini-Mental State Examination-Korean questionnaire were excluded. The Korean version of the Adult Self-Report (K-ASR) and a questionnaire were provided to the included patients. Age, diagnosis, and period after disease were obtained from medical records. The study was approved by the institutional review board of the hospital (IRB No. 2017-0748).

2) Measurements

The K-ASR was used to evaluate the stress level of the patients. This K-ASR is a reliable and valid self-report for assessing emotional and behavioral problems in individuals aged 18 years and above.[15] The K-ASR is an evaluation tool that was used as a measure to evaluate stress in previous studies.[16] The ASR comprises a 126-item checklist that uses a three-point scale and includes eight subscales: anxious/depressed, withdrawn, somatic complaints, aggressive behavior, rule-breaking behavior, intrusive, thought problems, and attention problems. The internalizing problem (IP) score consists of three subscales, namely anxious/depressed, withdrawn, and somatic complaints. Similarly, the externalizing problem (EP) score consists of three subscales, namely aggressive behavior, rule-breaking behavior, and intrusive. However, the total problem (TP) score consists of all eight subscales (IP, EP, thought problems, and attention problems).[17]

For the K-ASR, a higher raw score implies more behavioral problems. Raw scores were transformed into t scores that indicate whether individuals are exhibiting deviant behavior or deficiencies in competencies compared to norms for their age and sex. The t scores for IP, EP, and TP were standardized based on the percentile scores obtained from the normal Korean population. A t score of ≤ 59 (84th percentile) was classified as normal, scores between 60–63 (85th–90th percentile) were considered as borderline clinical, and a score of ≥ 64 (91st percentile) was considered as clinical.[18]

The questionnaire was used to evaluate factors that might affect stress levels in these patients. These factors included level of education, annual income, complications (spasticity, neuropathic pain, sleep disorder, bladder disorder, bowel disorder), and a period after the disease event.

3) Statistical analysis

Relationships between variables were evaluated using Spearman's correlation coefficient. Statistical analysis was performed using the SPSS ver. 18.0 for Windows (SPSS

Inc., Chicago, IL, USA) software program. A Spearman's correlation test was used to analyze the following factors: the period after the disease event, annual income, neuropathic pain, spasticity, sleep disorder, and bowel and bladder problems. The results were considered statistically significant when the p-value was ≤ 0.05.

Table 1. Baseline Characteristics of Chronic Stroke patients

Characteristics		Values
Total number (n)		30
Age (years, mean ± SD)		56.5 ± 18.0
Male: Female (n)		15:15
Education level (n)	Under high school graduate	4
	High school graduate	12
	Collage graduate	13
	Graduate school graduate	1
Diagnosis (n)	Cerebral infarction	17
	Cerebral hemorrhage	13
Period after the disease outbreak (years, mean ± SD)		5.3 ± 5.6
Annual income (n)	< 10 million (won)	17
	10 million ≤, < 30 million (won)	2
	30 million ≤, < 50 million (won)	5
	50 million ≤ (won)	6
Neuropathic pain	Absent	8
	Present	22
Spasticity	Absent	9
	Present	21
Sleep disorder	Absent	7
	Present	23
Bladder problems	Absent	8
	Present	22
Bowel problems	Absent	6
	Present	24

Results

1) Participant characteristics

The demographic details of the 30 included patients are presented in Table 1. A total of 30 patients agreed to participate. They received the K-ASR and questionnaires personally.

The mean age of the patients was 56.8 years. The diagnosis of stroke was confirmed with radiological evidence such as CT scan or MRI. We found that 17 patients (56.7%) had cerebral infarction and 13 patients (43.3%) had cerebral hemorrhage. Mean ± standard deviation period after the disease event was 5.3 ± 5.6 years. The majority of patients were high school graduates (40.0%) and college graduates (43.3%). Additionally, majority of patients had neuropathic pain (73.3%), spasticity (70.0%), sleep disorder (73.3%), bladder problem (73.3%), and bowel problem (80.0%) (Table 1).

2) The stress level of patients and associated factors

The mean K-ASR TP t score was 48.7. Two patients (6%) had TP scores in the clinical range, three patients (10%) had IP scores in the clinical range, and one patient (3%) had an EP score in the clinical range (Table 2).

The K-ASR TP scores negatively correlated with annual income and positively correlated with neuropathic pain and sleep disorder. In addition, the K-ASR IP scores negatively correlated with annual income and positively correlated with neuropathic pain. However, the score was not related to other factors such as spasticity, the period after the disease event, age, and bladder and bowel problems (Table 3).

Discussion

We evaluated stress levels in chronic stroke patients and investigated associated factors. We found that the stress level is similar to the 10% expected in the general population.[19] The rates for TP, IP, and EP scores in the clinical range were 6%, 9%, and 3%, respectively.

Previously, 20 to 30% of chronic stroke patients have been found to have anxiety disorders, independent of stroke severity.[20] Additionally, post-traumatic reactions following stroke events have been reported in patients.[21] Studies have also reported that post-traumatic stress disorder has a strong correlation with depression and anxiety.[22] This study used the Impact of Event Scale (IES), which is a 15-item scale measuring instruction (IESI) and avoidance symptoms (IESA).

Rates for the IES, IESI, and IESA scores in the clinical range were 31%, 22%, and 22%, respectively. The results showed that non-severe stroke patients seem to have frequent post-traumatic stress disorder symptoms.

In our study, annual income, neuropathic pain, and sleep disorder were correlated with stress levels. Stroke, among other morbidities, has one of the strongest inverse relations with socioeconomic status in the USA.[23] Similarly, in Korea, rehabilitation treatment for stroke patients costs a lot

Table 2. Prevalence of Behavior Problems in Chronic Stroke Patients

	Normal	Borderline clinical	Clinical	Total
Total behavior problems	27 (91)	1 (3)	2 (6)	30
Internalizing problems	25 (85)	2 (6)	3 (9)	30
Externalizing problems	28 (94)	1 (3)	1 (3)	30

Values are presented as number (%).

Table 3. Relationship between Stress in Patients and Associated Factors

		Spearman correlation coefficient (rho)	p-value
Total problems in patients	Annual income	- 0.391	0.033*
	Education level	- 0.257	0.170
	Spasticity	0.261	0.163
	Neuropathic pain	0.457	0.011*
	Sleep disorder	0.188	0.041*
	Bladder disorder	0.188	0.320
Internalizing problems in patients	Annual income	- 0.434	0.017*
	Education level	- 0.241	0.200
	Spasticity	0.184	0.338
	Neuropathic pain	0.406	0.026*
	Period after the disease outbreak	0.271	0.147
Externalizing problems in caregivers	Annual income	- 0.215	0.254
	Spasticity	0.219	0.244
	Neuropathic pain	0.329	0.076
	Sleep disorder	0.288	0.123

*$p < 0.05$ by spearman correlation analysis.

of money. Rehabilitation treatment is recognized as a must, so it is likely that there would be financial stress due to the cost of rehabilitation treatment. Therefore, it is thought that patients will receive a lot of stress if their annual income or assets are small. Previous studies in general populations have found a high prevalence of stroke risk factors in individuals with low socioeconomic status.[24] This may be due to the fact that socioeconomic status is inversely associated with blood pressure, physical inactivity, obesity, smoking, and diabetes.[25,26]

Central post-stroke pain is a neuropathic pain syndrome that can develop after stroke.[27] In addition, peripheral neuropathic pain may be combined and appear together with central neuropathic pain.[28] Chronic pain after stroke reportedly develops in 11–55% of patients.[29,30] In our study, 23% of patients had neuropathic pain for which they were taking medicine to control their symptoms. Insomnia after stroke occurs in 20–56% of chronic stroke patients, among which 18% report the recent onset of insomnia after stroke. Additionally, hypersomnia after stroke is reported by 1.1-27% of patients. In our study, 23% of patients presented with a sleep disorder.[31] Although considerable numbers of chronic stroke patients have these complications, only a few studies have correlated them with the stress level of patients.

More than 50% of stroke patients have sleep problems, especially in sleep-disordered breathing.[32] The prevalence of insomnia is higher in stroke patients compared to the

general population. The greater their sleep symptoms, the more likely they were to have depression.[33] Similarly, in our study, 23 patients (76%) answered the questionnaire that they had a sleep disorder. It was found that patients with sleep disorders had stress as well as depression, and this is likely to affect their quality of daily life. Therefore, further studies are required with a large number of patients.

This study demonstrated that the overall stress level of chronic stroke patients was not high, and it was related to neuropathic pain, sleep problem, and socioeconomic status. However, this study also had some limitations. The sample size was small, and we could not investigate other medical conditions such as hypertension, diabetes, and kidney disease. Also, depression and stress coping skills, which are important factors that affect stress, are not reflected in this study. In addition, the disease severity of stroke could not be reflected. Among 30 patients, 15 patients had an NIHSS score, and none of the patients who had stress were not able to check the NIHSS score. Therefore, further research is required to determine the direct cause.

Conclusion

We identified neuropathic pain, annual income, and sleep disorder as factors that affected stress in chronic stroke patients. However, the stress in these patients was not related to other factors such as spasticity, the period after the disease event, bladder and bowel problems.

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