SOME FACTORS RELATED TO FATIGUE STATUS IN ELDERLY POST-STROKE PATIENTS

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Abstract

Objectives: To identify factors related to fatigue status in elderly post-stroke patients. ***Methods:*** A cross-sectional study on 157 patients those ages ≥ 60, diagnosed with stroke (according to the World Health Organization - WHO) and examined or treated as inpatients and outpatients at the National Geriatric Hospital, from July to November 2021. Data were collected using designed tools including characteristics of these patients. Entered data on Redcap and used SPSS version 22.0 for analysis. ***Results:*** Relevant factors affecting fatigue in elderly patients after stroke were physical activity daily living, cognitive impairment by Mini-Mental State Examination (MMSE), sleep disturbance by Pittsburgh Sleep Quality Index (PSQI), depression, and malnutrition. Factors that increased the risk of fatigue were age ≥ 60, using medication total, and cognitive decline. ***Conclusion:*** Early detection by performing the Fatigue Severity Scale (FSS) test to screen for fatigue in elderly post-stroke patients can provide appropriate treatment that helps improve treatment effectiveness as well as patients' quality of life.

Keywords: Fatigue; Older patients; Post-stroke.

INTRODUCTION

Stroke is a cardiovascular disease and is defined by the WHO as a clinical syndrome, including "signs of brain dysfunction (focal or general) that develop rapidly, persist for 24 hours or more, or lead to death, with no identifiable cause other than a vascular etiology".

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Date received: 16/12/2023
Date accepted: 20/3/2024
http://doi.org/10.56535/jmpm.v49i4.630

Stroke is the third leading cause of death after cancer and cardiovascular disease in the United States, but second worldwide. In France, the mortality rate of stroke is 12% of the elderly and it is the leading cause of death in old age. According to the American Heart Association, there are about 700,000 strokes every year, with 163,000 deaths from stroke [1]. The incidence of stroke fluctuates significantly over a lifetime, for example, the incidence is about 10 - 20 per 10,000 people aged 55 - 64, while this rate rises to 200 per 10,000 people over the age of 85 [1]. In Vietnam, according to information from the Ministry of Health, there are about 200,000 cases of stroke each year, which is the leading cause of death, with a rate of 10 - 20%, many times higher than some other common causes of death.

Fatigue is a general psychophysiological phenomenon that diminishes the ability of the individual to perform a particular task by altering alertness and vigilance, together with the motivational and subjective states that occur during this transition. Mental fatigue is a common symptom following Traumatic Brain Injury (TBI), or stroke. In the case of long-lasting mental fatigue, mental fatigue could be one important factor that keeps people from returning to the full range of activities they pursued prior to their injury with work, studies and social activities. According to Schillinger and Becker, post-stroke fatigue (PSF) can be defined as "a subjective experience of protracted or recurrent tiredness and a reduced capacity for mental and/or physical activity". PSF is a state that is characterized by exhaustion and a considerable depletion of energy that often occurs without prior physical or mental exertion [2].

It is uncertain whether socio-demographic factors such as age, gender, marital status, living situation (living alone or not), education, and returning to paid work are associated with PSF [2]. Previous research findings are also contradictory in terms of the association between PSF and neuropsychological factors, such as the stroke location, type, and severity [2]. Currently, research on fatigue of patients after stroke is limited; there have been few studies on PSF in Vietnam, and these studies often focus on the relationship between depression and other factors of patients after stroke. Post-stroke fatigue acts only as

a risk factor and influences of depression in post-stroke patients. Therefore, we conducted this research: *To identify some factors related to fatigue status in elderly post-stroke patients*.

MATERIALS AND METHODS

1. Subjects

157 patients who were diagnosed with stroke (according to WHO), aged ≥ 60 years old, examined or treated at National Geriatric Hospital.

* *Inclusion criteria:* Age ≥ 60 years; diagnosed with stroke (according to WHO) by doctors and were being treated as inpatients and outpatients at the National Geriatric Hospital; had the physical and cognitive abilities (evaluated by MMSE) to do a face-to-face interview; patients and families agreed to participate in research.

* *Exclusion criteria:* Patients with a history of stroke more than 7 years; cases of dementia severity, inaccessible; aphasia case limiting in describing symptoms; pharyngeal paralysis, severe quadriplegia limits communication; history of pre-stroke psychosis: schizophrenia, major depression, bipolar disorder.

* *Setting and time:* Patients were diagnosed and treated at National Geriatric Hospital from July 12th to November 12th, 2021.

2. Methods

* *Study design:* A cross-sectional study.

* *Sample size and sampling:*

Sampling: Convenience sampling.

The sample size is calculated using the formula: $n = (Z_{1-\frac{\alpha}{2}})^2 \frac{p(1-p)}{d^2}$

n: Study sample size;

α: Statistical significance level, with α = 0,05; $(Z_{1-\alpha/2}) = 1,96$

p = 0.641 (Prevalence of PSF among post-stroke patients in Schepers's study in 2006) [3].

d = expected error (d = 0.075). From the formula, the estimated sample size was 157 post-stroke older patients. The number of post-stroke older patients in our study was 157.

* *Tools and data collection method:* General information including date of interview, contact information, full name, age, gender, level of education, occupation, living status, and living area.

Data were collected using designed tools included: MMSE: A score of 24 - 30 is normal cognitive status, less than 24 points indicates cognitive decline; PSQI: Total score PSQI is calculated by sum of 7 components,

the maximum of a normal sleep is less than 5, if result is more than or equal 5, the participant will get poor sleep; Mini Nutritional Assessment Short Form (MNA-SF): 12 - 14 points (normal), 8 - 11 points (risk of malnutrition), and 0 - 7 points (malnutrition); Barthel Index (BI) for Activities of Daily Living (ADL) and Instrumental Activities of Daily Living (IADL) include dependent and independent, Patient Health Questionnaire - 9 (PHQ-9): Interpretation of total score depression severity: 1 - 4 (minimal depression), 5 - 9 (mild depression), 10 - 14 (moderate depression), 15 - 19 (moderately severe depression), and 20 - 27 (severe depression).

Fatigue assessment: Using FSS to assess fatigue status of the participant. The time to evaluate FFS is after the patient has recovered and can be interviewed. Performing: The original FSS is a nine-item unidimensional questionnaire developed by Krupp, LaRocca, Muir-Nash, and Steinberg (1989). The mean score of the items is used as the FSS score. FSS consists of 9 items, each is scored using a Likert-type scale ranging from 1 (strongly disagree) to 7 (strongly agree). The participants were asked to complete the version of FSS, regarding the previous week. Total score is the sum of these items divided by the number of items. Evaluation: High scores indicate high levels of fatigue. A total score of less than 36 suggests that you may not be suffering from fatigue. A total score of 36 or more suggests that you may need further evaluation by a physician.

* *Data processing and data analysis:* The process of data recording, entries into Redcap and analyzed by using Statistical Package for Social Science (SPSS) software version 22 with statically $p < 0.05$. Descriptive statistics were adopted to examine characteristic data: Frequency, percentage, mean. Inferential statistics was done to perform comparisons between groups, using χ^2.

3. Ethics

All data collected was used for research. The results of the study were proposed for improving the health of the community, not for other purposes, and to ensure all ethical issues in biological research. We are committed to have no conflicts of interest in this research.

RESULTS

A total number of 157 patients were recruited for the study from July 12th to November 12th, 2021. Results of this study presented in detail in below.

Table 1. The association between fatigue status and demographic characteristics (n = 157).

Related factors		FSS		p
		Normal n (%)	Fatigue n (%)	
Gender	Male	27 (67.5)	56 (47.9)	0.024
	Female	13 (32.5)	61 (52.1)	
Age	< 60	5 (12.5)	4 (3.4)	0.048
	≥ 60	35 (87.5)	113 (96.6)	
Marital status	Married	36 (90)	98 (83.8)	0.246
	Single/widowed/divorced	4 (10)	19 (16.2)	
Education level	Secondary school and below	19 (47.5)	72 (61.5)	0.266
	High school	9 (22.5)	22 (18.8)	
	College/university and above	12 (30)	23 (19.7)	

Of all male participants, there were 32.5% patients with normal and 47.9% with fatigue status. In terms of age, the age group ≥ 60 had 96,6% with fatigue status, < 60 years old had 3,4% with fatigue status. The difference between these age groups was statistically significant ($p < 0.05$). There were no significant differences between FSS and material status and education level ($p > 0.05$).

Table 2. The association between comorbidities, medication and FSS (n = 157).

Variable		FSS score		p
		Normal n (%)	Fatigue n (%)	
Comorbidities	≤ 4	32 (80)	78 (66.7)	0.080
	> 4	8 (20)	39 (33.3)	
Medication total	≤ 5	28 (71.8)	49 (41.9)	0.001
	> 5	11 (28.2)	68 (58.1)	

The number of comorbidities ≤ 4 had a fatigue rate of 66.7%, > 4 had a fatigue rate of 33.3%. There was no significant difference between these 2 groups

($p > 0.05$). A total number of medications ≤ 5 had a fatigue rate of 41.9%; > 5 had 58.1%. The difference between these groups is statistically significant ($p < 0.05$).

Table 3. The association between quality of life and FSS score (n = 157).

Quality of life		FSS		p
		Normal n (%)	Fatigue n (%)	
Physical activity daily living (ADL)	Dependent	14 (35)	76 (65)	0.001
	Independent	26 (65)	41 (35)	
Instrument activities of daily living (IADL)	Dependent	31 (77.5)	95 (81.2)	0.383
	Independent	9 (22.5)	22 (18.8)	

In terms of physical activity daily living (BI), patients with dependent had 65% fatigue; patients with independent had 65% fatigue, the difference between these age groups was statistically significant ($p < 0.05$). Instrument activities of daily living (IADL) in dependent patients had 81.2% fatigue; independent patients had 18.8% fatigue. There were no significant differences ($p > 0.05$).

Table 4. Association between mental health status and FSS (n = 157).

Characteristics		FSS		p
		Normal n (%)	Fatigue n (%)	
MMSE	Normal	22 (55)	40 (34.2)	0.017
	Cognitive decline	18 (45)	77 (65.8)	
PSQI	Good sleep	13 (32.5)	16 (13.7)	0.01
	Poor sleep	27 (67.5)	101 (86.3)	

MMSE: Patients with MMSE normal had 35.2% fatigue; patients with cognitive decline had 65.8% fatigue. Patients with good sleep had 13.7% fatigue; patients with poor sleep had 86.3% fatigue. The difference between these age groups was statistically significant ($p < 0.05$).

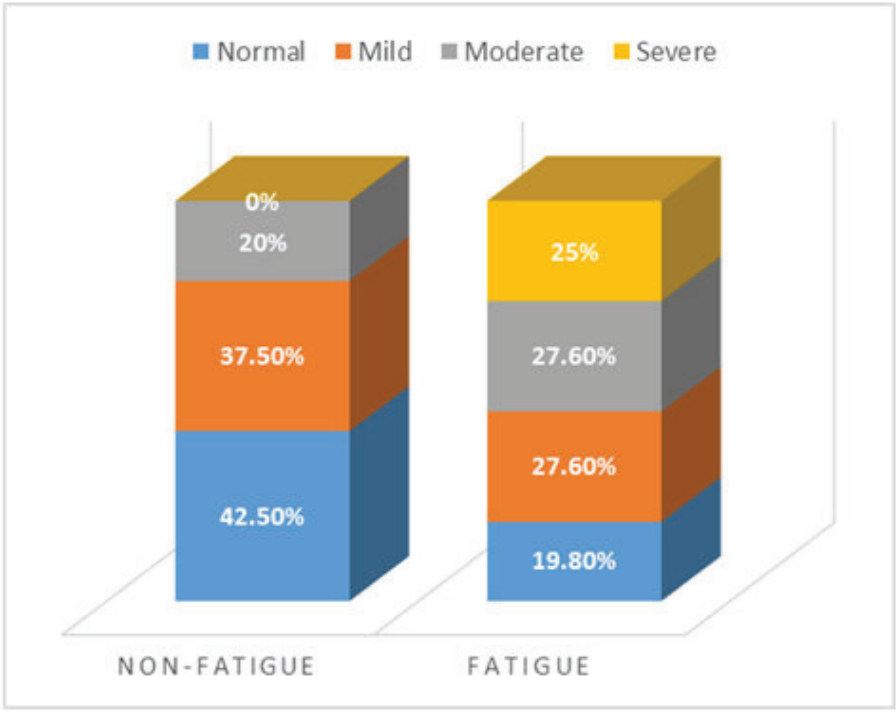

Figure 1. The association between depressive symptoms and FSS (n = 157).

Normal patients had 19,8% fatigue, patients with mild depressive symptoms had 19,8% fatigue; patients with mild depressive symptoms had 27,6% fatigue; patients with moderate depressive symptoms had 27,6% fatigue; patients with mild depressive symptoms had 25% fatigue.

Table 5. The association between nutrition status and FSS (n = 157).

Nutrition status		FSS		p
		Normal n (%)	Fatigue n (%)	
MNA-SF	Normal	7 (17.5)	6 (5.1)	0.014
	Risk of Malnutrition	24 (60)	63 (53.8)	
	Malnutrition	9 (22.5)	48 (41)	

Patients at risk of malnutrition and malnutrition with fatigue were 53.8% and 41%. The difference between these groups was statistically significant ($p < 0.05$).

Table 6. Multivariable regression models on some factors related to fatigue in elderly post-stroke patients.

Characteristic	FSS			
	OR	95%CI		p
		Lower	Upper	
Age (> 60 years)	3.447	0.813	14.620	0.093
Gender (female)	2.121	0.960	4.683	0.063
Medication	3.430	1.532	7.679	0.003
Barthel index (dependent)	0.367	0.138	0.978	0.045
IADL (dependent)	0.277	0.085	0.897	0.032
MMSE (cognitive impairment)	1.226	0.473	3.179	0.675
PSQI (poor sleep)	3.039	1.304	7.083	0.010
PHQ-9 (depression)	2.989	1.376	6.490	0.006
MNA-SF (malnutrition)	3.924	1.233	12.488	0.021

The risk factors for fatigue in patients after stroke were using more than 5 drugs (OR 3.43, 95%CI: 1.532 - 7.679, p = 0.003); dependence in daily activities assessed by Bethel Index scale (OR 0.367, 95%CI: 0.138 - 0.978, p = 0.045) and IADL scale (OR 0.277, 95%CI: 0.085 - 0.897, p = 0.032); patients experiencing depression (OR 2.989, 95%CI: 1.376 - 6.490, p = 0.006), participants had poor sleep (OR 3.039; 95%CI: 1.304 - 7.083; (p = 0.010) and those at risk and/or already malnourished (OR 3.924, 95%CI: 1.233 - 12.488, p = 0.021). There was no statistical significance between fatigue and age, gender and cognitive impairment with p > 0.05.

DISCUSSION

1. The association between post-stroke fatigue and demographic characteristics and comorbidities disease

Complaints of difficulty sleeping increase with age. In this study, there was no statistically significant relationship between fatigue and age. This is similar to an earlier study of 1306 patients in Switzerland between 2005 and 2007 [4]. We found no significant association of FSS with educational attainment and marital status. This is similar to previous research in Sweden. In addition, in the Swedish study, there was a weak association between FSS and gender: The mean difference in FSS in females compared with males was 0.21 ($p = 0.04$); but in this study, no association was found between gender and FSS, with $p = 0.063$ [3]. Differences in results may be explained by differences between sample size, mean age, and cross-sectional studies. In this study, no statistical significance was found between comorbidities and fatigue, with $p > 0.05$. This is in contrast to the study of Kjeverud et al., a study of fatigue in 115 patients after stroke showed that fatigue was also associated with more pre-existing comorbidities ($p = 0.0180$) [5]. Differences in results may be explained by differences between sample size, mean age, and cross-sectional studies. The use of multiple drugs in combination also affects the movement and mental health of the patient related to the side effects of the drug. In this study, we found that the combined use of > 5 drugs had an effect on fatigue, which is a statistically significant relationship with $p = 0.003$.

2. The association between post-stroke fatigue and quality of life

Research by Badaru et al. showed that PSD alone ($p = 0.002$) and both PSF and PSD ($p = 0.02$) were significantly associated with ADL, while PSF alone was not ($p = 0.233$). PSD alone ($p = 0.001$) and both PSF and PSD ($p = 0.001$) significantly negatively affect IADL, while PSF alone had no significant effect ($p = 0.2$) [6]. This is different from our research results, when using the multivariable regression method, there is a significant correlation between fatigue and functional independence in activities of daily living (BI and IADL) with p times of 0.045 and 0.032, respectively. This difference can be explained by sample size and research subjects.

3. The association between post-stroke fatigue and mental health

Out of a total of 157 participants, the percentage of patients with cognitive impairment was 60.5%; the percentage of patients with cognitive impairment with fatigue is 65.8%, after using the multivariate regression method, there is no significant relationship between cognitive impairment and fatigue in post-stroke patients, with p = 0.675. This is in contrast to a previous study in France on the association between fatigue and cognitive decline in 6-month stroke patients, which found a significant association between fatigue and cognitive impairment, with p < 0.001 [7]. Differences in results may be explained by differences between sample size and research objects.

The relationship between fatigue after stroke and sleep disturbance is statistically significant (p < 0.05) because the more sleep disturbances increase, the more physically and mentally the patient is affected. This leads to patients' fatigue getting worse. In the study of Nadal-Nicolás et al. on women with Fibromyalgia, correlations were shown showed a relationship between fatigue and sleep variables (R = 0.411; p = 0.046) [8]. In addition, the study by Badaru et al. also showed a significant association between rates of depression, fatigue, and reduced quality of life [6]. There is a strong link between mental health and fatigue. Careful assessment is required for timely intervention and support, minimizing the impact and improving the patients' quality of life.

4. The association between post-stroke fatigue and nutritional status

In this study, the percentages of patients at risk of malnutrition and malnutrition with fatigue were 53.8% and 41%, respectively. We found a significant relationship between fatigue and the risk of malnutrition in elderly patients after stroke. This is consistent with the results of a previous study in Tehran, which studied malnutrition and some related factors in elderly people living in nursing homes in Tehran. In 119 elderly people over 65 years old, the results of the statistical analysis of data showed a positive relationship between malnutrition and fatigue (p < 0.0001) [9].

5. Multivariable regression association between related factors and post-stroke fatigue

This study indicated that the total amount of medication the patient

was taking, functional status, sleep disturbance, depression, and malnutrition were independently associated features in patients with post-fatigue symptoms. In patients with fatigue, the percentage of patients on maintenance use of > 5 drugs was 1.387 times higher than in patients using 5 or less than 5 drugs, 95%CI: 1.532 - 7.679, p = 0.003. In addition, fatigue also affects dependence on activities and tools of daily living; the proportion of patients dependent on daily living with fatigue increased 1.8536 times (95%CI: 0.138 - 0.978, p = 0.045), and the proportion of patients dependent on tools of daily living was 4.318 times higher than that of patients dependent on tools for daily living for the independents (95%CI: 0.085 - 0.897, p = 0.032). Besides, the proportion of patients with poor sleep was 4.405 times higher than that of patients with good sleep (95%CI: 1.304 - 7.083, p = 0.010). The proportion of patients with signs of depression was 2.83 times higher than those without signs of depression (95%CI: 1.376 - 6.490, p = 0.006). Not only that, the proportion of patients at risk of malnutrition was 11.07 times higher than that of patients without risk of malnutrition (95%CI: 1.233 - 12.488, p = 0.021).

CONCLUSION

After evaluating associated factors among 157 elderly post-stroke patients at the National Geriatric Hospital, the results of the statistical analysis indicated the following remarkable findings: Relevant factors affecting fatigue in elderly patients after stroke are physical activity daily living, cognitive impairment by MMSE, sleep disturbance by PSQI, depression, and malnutrition. Factors that increase the risk of fatigue are age over 60, medication total, and cognitive decline. We suggest the following recommendations: Early detection by performing the FSS test to screen for fatigue in elderly post-stroke patients, thereby providing appropriate treatment, can help improve treatment effectiveness as well as patients' quality of life.

Acknowledgment: We would like to thank all participants in this study and medical staff at National Geriatric Hospital.

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