An analysis of selected factors related to falls among stroke patients treated at Cua Dong general hospital

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ABSTRACT

Objective: To analyze some factors related to falls in stroke patients treated at Cua Dong General Hospital – Nghe An in 2024.

Study subjects: 55 stroke patients, including both hemorrhagic and ischemic strokes (with or without falls after stroke), who were examined and treated at Cua Dong General Hospital from February 2024 to October 2024.

Method: Cross-sectional descriptive study.

Results: The average age of the fall group was 67.45 ± 11.08 years, with 45.45% having a history of falls, of which 60% were women. Some clinical features with a high incidence in patients who fell after a stroke include: balance disorders (64%), sensory disorders (40%), sleep disturbances (44%), and visual disturbances (32%). 28% of patients after falling had severe consequences such as fractures, vertebral compression, and 40% had mild consequences such as skin abrasions and bruises. The average FES-I score (fear of falling assessment) was higher in the fall group (51.68 ± 10.88) compared to the non-fall group (37.27 ± 10.02). Regression analysis showed that factors related to falling in stroke patients include: Female gender (OR = 4.929, p = 0.007), age (OR = 1.081, p = 0.01), balance disorders (OR = 4.889, p = 0.007), use of psychotropic drugs (OR = 4.615, p = 0.016), frequent use of ≥4 medications (OR = 4.125, p = 0.015), and fear of falling (OR = 1.140, p < 0.001).

Conclusion: This study demonstrated that female gender, older age, balance disorders, psychotropic drug use, number of medications used, and fear of falling are factors associated with the risk of falling in stroke patients.

Keywords: Stroke, fall risk, fear of falling.

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I. INTRODUCTION

Stroke is a major cause of disability and death around the world. The World Health Organization (WHO) estimates that approximately 15 million people experience a stroke each year. Of these, about 5 million result in death, while another 5 million live with long-term effects.[1] Impaired mobility and poor balance are common issues among stroke patients, significantly increasing their risk of falls. A study conducted in the United States America (USA) found that 50-70% of stroke patients experience at least one fall during their recovery process.[2]

Falls not only lead to injuries like fractures and dislocations, but they also elevate the risk of death and disability in patients. Some studies indicate that the mortality rate for stroke patients who fall within six months is twice as high as that of patients who do not experience falls. Furthermore, falls hinder recovery of motor function and increase reliance on caregivers, significantly impacting patients' quality of life.[3] Currently, there is a greater concern for interventions during the acute phase of stroke and the early complications that arise, often overshadowing late complications, particularly the risk of falls. Understanding the factors associated with falls in stroke patients is crucial in clinical practice. This knowledge helps in developing effective prevention and intervention strategies to reduce falls and support patients' recovery processes. Therefore, we conducted a study with the following objective: ***"An analysis of selected factors related to falls among stroke patients treated at Cua Dong general hospital."***

II. SUBJECT AND METHOD

2.1. Subject

Patients diagnosed with stroke, including hemorrhage and infarction (with or without post-stroke falls), were examined and treated at Cua Dong General Hospital from February 2024 to October 2024.

Inclusion criteria:

▪ Patients aged 18 years and older, diagnosed with stroke, confirmed by clinical assessment or imaging.

+ Clinical criteria: According to the World Health Organization's definition of stroke from 1990, a stroke is characterized by a sudden onset of neurological functional deficits that are typically localized rather than diffuse. These deficits last for more than 24 hours or lead to death within that time frame, and traumatic causes must be excluded through examinations. Localized neurological signs may include hemiplegia, sensory disturbances, facial paralysis, aphasia, sphincter dysfunction, and altered consciousness, among others.

+ Imaging criteria: there is appropriate brain damage on CT/MRI.

▪ Patients were selected two weeks after the onset of stroke. They must be conscious enough to answer the questionnaire and be able to walk independently or with the help of walking aids. The participants were divided into two groups: those who experienced falls after the stroke and those who did not.

Exclusion criteria

Participants will be excluded from the study if any of the following conditions apply:

- Severe cognitive impairment (not alert enough to answer questions).

- Neurological disorders other than stroke (such as Parkinson's disease or Multiple Sclerosis), severe mental illnesses requiring medication management, or significant traumatic brain injuries.

- Severe language disorders.

- Patients or their relatives do not consent to participate in the study.

2.2. Method

This study was conducted as a cross-sectional analysis, where all patients were interviewed about their medical history and underwent examinations to diagnose a stroke. Following these assessments, data on their medical history, clinical symptoms, and paraclinical findings were collected. Muscle strength on the affected side was evaluated using the classification system established by Henry et al. Additionally, the risk of falling and the fear of falling were assessed using a pre-designed medical record form. Data entry and management were carried out using EpiData 3.1 and SPSS 20.0 software.

III. RESULT

3.1. Clinical characteristics

***Table 1**. Age and Gender Distribution Characteristics*

Sex	Fallers (n=25) n (%)	Non-fallers (n=30) n (%)	Total (n=55) n (%)
Male	10 (40%)	23 (76.7%)	33 (60%)
Female	15 (60%)	7 (23.3%)	22 (40%)
Mean age ($n \pm \overline{SD}$)	71.88 ± 10.30	63.77 ± 10.47	67.45 ± 11.08

Among the 55 patients, 60% were male, and the mean age was 67.45 ± 11.08. A higher proportion of fallers were female (60%), compared to the non-faller group, where females comprised the majority (76.3%).

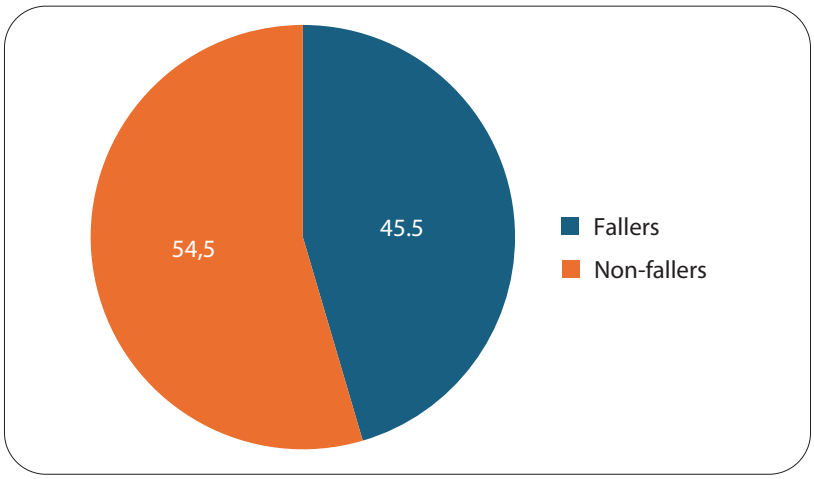

***Figure 1**. Incidence of falls among patients with cerebrovascular stroke*

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***Table 2**. Consequences of falling*

Consequences of falling		Fallers (n=25) (n, %)	
Severe consequences	Femoral neck fracture	3	28
	Vertebral collapse	2	
	Forearm fracture	2	
Mild consequences (skin abrasions, bruises…)		10	40
No consequences		8	32

After falling, 28% of patients suffered significant complications, most commonly femoral neck fracture, vertebral collapse fracture, and forearm fracture, which substantially impacted their mobility and recovery process.

***Table 3**. Evaluation of the fear of falling using the Fall Efficacy Scale International (FES-I).*

FES-I Scale	Fallers (n=25) n (%)	Non-fallers (n=30) n (%)	Total (n=55) n (%)
Low fear of falling (16-19)	1 (4%)	1 (3.3%)	2 (3.6%)
Moderate fear of falling (20-27)	0 (0%)	5 (16.7%)	5 (9.1%)
High fear of falling (28-64)	24 (96%)	24 (80%)	48 (87.3%)
Mean FES-I score	51.68 ± 10.88	37.27 ± 10.02	43.82 ± 12.60

The majority of the study subjects had a high fear of falling, accounting for 87.3%. This was especially pronounced in the group that experienced falls, where the high fear of falling accounted for 96.0%.

3.2. Analysis of some factors related to falls using logistic regression.

***Table 4**. Analysis of some factors related to falls following a stroke using univariate logistic regression.*

Factors		Fallers (n=25) n (%)	Non-fallers (n=30) n (%)	OR (95% CI)	p
Gender	Male	10 (40%)	23 (76.7%)	4.929 (1.538 - 15.793)	0.007
	Female	15 (60%)	7 (23.3%)		
Average age		71.88 ± 10.31	63.77 ± 10.47	1.081 (1.018 - 1.147)	0.01

Factors		Fallers (n=25) n (%)	Non-fallers (n=30) n (%)	OR (95% CI)	p
Balance disorder	Yes	16 (64%)	8 (26.7%)	4.889 (1.549 - 15.435)	0.007
	No	9 (36%)	22 (73.3%)		
Use of psychotropic medication	Yes	12 (48%)	5 (16.7%)	4.615 (1.336 - 15.949)	0.016
	No	13 (52%)	25 (83.3%)		
Number of medications	≥ 4	15 (60%)	8 (26.7%)	4.125 (1.322 - 12.872)	0.015
	< 4	10 (40%)	22 (73.3%)		
Mean FES-I score		51.68 ± 10.87	37.27 ± 10.01	1.140 (1.062 - 1.224)	< 0.001

In a univariate logistic regression analysis, the following factors were found to be associated with falls after a stroke: Gender: Odds Ratio (OR) = 4.929 (95% Confidence Interval [CI]: 1.538 – 15.793), p = 0.007; average age: OR = 1.081 (95% CI: 1.018 – 1.147), p = 0.01; balance disorder: OR = 4.889 (95% CI: 1.549 – 15.435), p = 0.007; use of psychotropic drugs: OR = 4.615 (95% CI: 1.336 – 15.949), p = 0.016; number of medications ≥ 4: OR = 4.125 (95% CI: 1.322 – 12.872), p = 0.015; mean FES-I score: OR = 1.140 (95% CI: 1.062 – 1.224), p < 0.001. These results suggest that several demographic and clinical factors increase the likelihood of falls in individuals who have had a stroke.

***Table 5**. Analysis of some factors related to falls following a stroke using multivariate logistic regression.*

Factors	Coefficient B	p	OR	95% CI
Gender	1.527	0.06	4.607	0.935 - 22.695
Average age	0.081	0.81	1.085	0.990 - 1.188
Balance disorder	-0.913	0.29	2.492	0.459 - 13.534
Use of psychotropic medication	-0.893	0.32	2.444	0.420 - 14.290
Number of medications ≥ 4	-0.628	0.45	1.874	0.362 - 9.689
Mean FES-I score	0.96	0.026	1.100	1.011 - 1.197

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We identified factors linked to the risk of falling in post-stroke patients through univariate logistic regression analysis and incorporated them into a multivariate logistic regression model. The results indicated that the fear of falling, as measured by the average FES-I score, was significantly associated with the risk of falling, with an odds ratio (OR) of 1.100 (95% CI: 1.011 – 1.197) and a p-value of 0.026.

IV. DISCUSSION

Our study evaluated the incidence of falls and associated risk factors among stroke patients at Cua Dong General Hospital. The assessment of balance impairment in stroke survivors should be given substantial attention, as it serves as a significant predictor of long-term physical function, mobility, and perceived recovery potential. The findings of this study are expected to support researchers and clinicians in the evaluation and development of more effective treatment and rehabilitation strategies.

The fall rate among stroke patients in our cohort was 45.5%, underscoring the high prevalence and serious nature of falls in the post-stroke population. This elevated rate highlights falls as a common and critical complication that can adversely affect patient outcomes and quality of life.

The average age of participants was 67.45 years (±11.08), and age was identified as a significant risk factor for falls (OR = 1.081, p = 0.01). This finding is consistent with previous studies, such as that by Fayaz Khan et al. (2021), which indicated that women were more likely to experience falls.

Fear of falling emerged as a critical psychological factor in this study. According to the FES-I assessment, 87.3% of all participants reported a high level of fear, with the rate rising to 96.0% among those who had previously fallen. This fear may initiate a negative feedback loop-limiting mobility, increasing dependence, and ultimately elevating the risk of subsequent falls. Both univariate (OR = 1.140, p < 0.001) and multivariate (OR = 1.100, p = 0.026) analyses confirmed fear of falling as an independent risk factor. These findings are consistent with research by Delbaere et al, which identified fear of falling as an independent risk factor for falls among the elderly.[7] Fear of falling hinders rehabilitation, reduces mobility and flexibility, and limits the ability to function independently. Additionally, it increases anxiety and depression, severely affecting the quality of life for stroke patients.[8] In clinical practice, evaluating the fear of falling is crucial for enhancing comprehensive interventions. It helps break the vicious cycle, reduce anxiety, promote community reintegration, and improve the patient's quality of life.

Medication-related factors also played a critical role in fall risk. Nearly half (48%) of the patients who experienced falls were using psychotropic drugs, and 60% were taking four or more medications, thus meeting the criteria for polypharmacy. Regression analysis demonstrated significant associations between falls and both psychotropic drug use (OR = 4.615, p = 0.016) and polypharmacy (OR = 4.125, p = 0.015). These findings align with the research conducted by Leipzig et al, which also identified psychotropic drug use and polypharmacy as critical risk factors for falls in the elderly.6. Medications acting on the central nervous system can impair alertness, balance, and coordination—functions already compromised in stroke survivors.

V. CONCLUSIOIN

This study found that several factors are

associated with falls in post-stroke patients, including being female, being older, using psychotropic medications, taking multiple medications, and experiencing a fear of falling. Identifying and addressing these risk factors may help reduce the likelihood of falls and enhance the quality of life for these patients.

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