

# Analysis of some factors related to stroke patients treated at Cua Dong general hospital in Nghe An in 2024

Nguyen Van Quan<sup>1✉</sup>, Nguyen Thi Nga<sup>2</sup>

<sup>1</sup> Cua Dong General Hospital – Nghe An

<sup>2</sup> Vinh Medical University

## Correspondence to

Nguyen Van Quan

Cua Dong General Hospital – Nghe An

Manuscripts submission:

Peer Review:

Manuscripts accepted:

## ABSTRACT

**Objective:** To analyze some factors related to falling 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  $67.45 \pm 11.08$  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 ( $51.68 \pm 10.88$ ) compared to the non-fall group ( $37.27 \pm 10.02$ ). 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  $\geq 4$  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.

## 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.<sup>1</sup> 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.<sup>2</sup>

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.<sup>3</sup> 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: *"Analysis of some factors related to stroke patients treated at Cua Dong General Hospital in Nghe An in 2024."*

## 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.

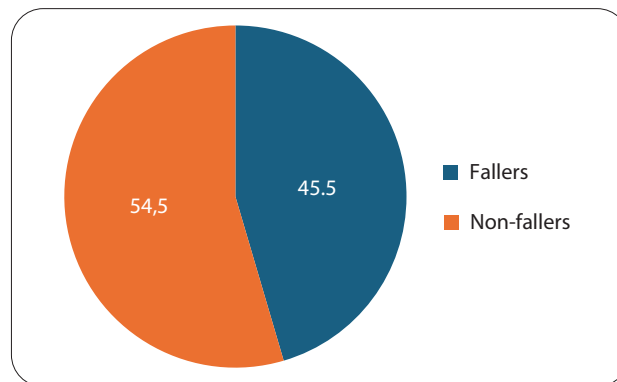
### III. RESULT

#### 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 ± $\bar{SD}$ )	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.** The incidence of falls in patients who have experienced a stroke versus those who have not

**Table 2.** Clinical features in patients

Clinical features	Fallers (n=25) n (%)	Non-fallers (n=30) n (%)	Total (n=55) n (%)
Recurrent Stroke	11 (44%)	7 (23.3%)	18 (32.7%)
Visual disturbances	8 (32%)	6 (20%)	14 (25.5%)
Hearing disturbances	4 (16%)	0 (0%)	4 (7.3%)
Balance disturbances	16 (64%)	8 (26.7%)	24 (43.6%)

Clinical features	Fallers (n=25) n (%)	Non-fallers (n=30) n (%)	Total (n=55) n (%)
Sensory disturbances	10 (40%)	9 (30%)	19 (34.5%)
Sphincter dysfunction	4 (16%)	2 (6.7%)	6 (10.9%)
Sleep disturbances	11 (44%)	7 (23.3%)	18 (32.7%)

Balance disorders were the most common, affecting 43.6% of patients, and were present in 64% of those who experienced falls. In contrast, hearing disorders were found in only 7.3% of patients, and they occurred exclusively in individuals with falls.

**Table 3.** 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, patients experience severe consequences 28% of the time and mild consequences 40% of the time.

**Table 4.** 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 5.** 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
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  $\geq 4$ : 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 6.** 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 $\geq 4$	-0.628	0.45	1.874	0.362 - 9.689
Mean FES-I score	0.96	0.026	1.100	1.011 - 1.197

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

In a study conducted at Cua Dong General Hospital involving 55 stroke patients, we found that 45.5% of the participants had a history of falls, with women making up 60% of this group. The average age of all patients was 67.45 years ( $\pm 11.08$ ), which was the same for those with a history of falls. Our findings indicated that being female (OR = 4.929,  $p = 0.007$ ) and older age (OR = 1.081,  $p = 0.01$ ) were significant factors associated with falls in post-stroke patients. These results are consistent with a study by Fayaz Khan et al. (2021), which identified older age and being female as risk factors that contribute to impaired balance and an increased risk of falls in this population.<sup>4</sup> Patients who experience falls after a stroke often exhibit clinical features with high prevalence rates, including: balance disorders (64%), sensory disorders (40%), sleep disorders (44%), and visual disorders (32%).

Our study found that 28% of patients who experienced a fall suffered severe consequences, such as fractures and vertebral collapse. Additionally, 40% of patients had mild consequences, including skin abrasions and bruises. These findings align with the research conducted by Forster & Young et al, which identified falls as the leading cause of fractures and other serious injuries in patients following a stroke.<sup>5</sup> Stroke patients often have multiple

underlying health conditions that contribute to various risk factors, resulting in the need for numerous medications. In our study, we found that among patients who experienced falls, 48% were using psychotropic drugs, and 60% regularly took four or more different types of medications. Regression analysis indicated a significant relationship between falls and the use of psychotropic drugs (OR = 4.615,  $p = 0.016$ ) as well as polypharmacy, defined as using four or more medications (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.<sup>6</sup>

The fear of falling was assessed using the FES-I, which was a significant factor in this study. The results indicated that 87.3% of patients experienced a high fear of falling, with this percentage rising to 96.0% among those who had experienced falls. In elderly individuals, particularly those who have suffered a stroke, the sensory, motor, and balance systems are often weakened, leading to an increased fear of falling as well as a higher incidence of falls. Research shows that 32-66% of stroke patients report a fear of falling, while 26-73% have experienced at least one fall within six months following their stroke. This relationship is bidirectional; falls can exacerbate the fear of falling, and conversely, fear of falling is a risk factor for actual falls. Our study demonstrated that fear of falling was strongly associated with the risk of falling in both univariate (OR = 1.140;  $p < 0.001$ ) and multivariate (OR: 1.100;  $p = 0.026$ ) analyses. 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.<sup>7</sup> 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.<sup>8</sup> 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.

## V. CONCLUSION

This study found that several factors are associated with falls in post-stroke patients, including being female, being older, having balance disorders, 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.

## REFERENCES

1. World Health Organization. (2020). "The Global Burden of Stroke." World Health Organization.
2. Karlsson, D. et al. (2013). "Fall Incidence and Risk Factors in Stroke Patients: A Systematic Review." *Journal of Stroke and Cerebrovascular Diseases*, 22(6), 880-886.
3. Johansen, L. et al. (2019). "Risk Factors and Consequences of Falls in Stroke Patients." *Journal of Rehabilitation Research and Development*, 56(4), 499-506.
4. Khan F, Chevidikunnan MF. Prevalence of Balance Impairment and Factors Associated with Balance among Patients with Stroke. A Cross Sectional Retrospective Case Control Study. *Healthcare*. 2021;9(3):320. doi:10.3390/healthcare9030320
5. Forster, A., & Young, J. (1995). Incidence and Consequences of Falls Due to Stroke: A Systematic Inquiry. *BMJ*, 311(6997), 83-86.
6. Leipzig, R. M., Cumming, R. G., & Tinetti, M. E. (1999). Drugs and Falls in Older People: A Systematic Review and Meta-Analysis: I. Psychotropic Drugs. *Journal of the American Geriatrics Society*, 47(1), 30-39.
7. Delbaere, K., Close, J. C., Mikolaizak, A. S., Sachdev, P. S., Brodaty, H., & Lord, S. R. (2010). The Falls Efficacy Scale International (FES-I). A Comprehensive Longitudinal Validation Study. *Age and Ageing*, 39(2), 210-216.
8. Scholz M., Haase R., Trentzsch K., et al. (2021). Fear of Falling and Falls in People with Multiple Sclerosis: A Literature Review. *Mult Scler Relat Disord*, 47, 102609.