

## Prevalence of Deep Venous Thrombosis in Stroke Patients: A Hospital-Based Cross-Sectional Study

Muzzafar Mohi-Ud-Din Hakeem<sup>1</sup>, Nisar Ul Hassan<sup>2</sup>, Adeel Ahmad Rather<sup>3</sup>, Yawar Yaseen<sup>4</sup>

<sup>1,2,3,4</sup>Postgraduate Department of Medicine, Government Medical College, Srinagar, J&K, India

Received: 25-03-2025 / Revised: 23-04-2025 / Accepted: 26-05-2025

Corresponding Author: Dr. Nisar ul Hassan

Conflict of interest: Nil

### Abstract:

**Background:** Deep venous thrombosis (DVT) is a common complication in immobilized patients, particularly those with acute stroke. Despite improvements in prophylaxis, its occurrence remains a significant contributor to morbidity and mortality. Objectives: This study aimed to determine the prevalence of DVT among stroke patients admitted to a tertiary care center in North India.

**Methods:** A hospital-based cross-sectional study was conducted on 120 stroke patients over two years. Patients were evaluated clinically and with duplex ultrasonography. Demographic data, comorbidities, stroke type, limb weakness, D-dimer levels, and prophylactic measures were assessed.

**Results:** Of 120 patients, 6 (5%) developed DVT. All cases occurred in the paralysed limb and within 16 days post-stroke. Hemorrhagic stroke patients showed a significantly higher prevalence (7.5%) versus ischemic stroke (0%). DVT correlated with advanced age, lower limb power, and comorbidities like diabetes and hypertension.

**Conclusion:** DVT is not uncommon in acute stroke patients, especially those with hemorrhagic stroke and significant immobility. Preventive strategies including mechanical and judicious chemoprophylaxis are critical.

**Keywords:** Deep Venous Thrombosis, Stroke, Hemorrhagic Stroke, Paralysis, D-Dimer, Prophylaxis.

This is an Open Access article that uses a funding model which does not charge readers or their institutions for access and distributed under the terms of the Creative Commons Attribution License (<http://creativecommons.org/licenses/by/4.0>) and the Budapest Open Access Initiative (<http://www.budapestopenaccessinitiative.org/read>), which permit unrestricted use, distribution, and reproduction in any medium, provided original work is properly credited.

### Introduction

Deep venous thrombosis (DVT) represents a serious complication in patients with acute stroke, primarily due to prolonged immobility. Stroke patients, especially those with hemiplegia or severe paresis, are at increased risk of venous thromboembolism (VTE), including pulmonary embolism (PE), which is a potentially fatal condition.

The pathogenesis of DVT in stroke patients includes factors such as immobility, endothelial injury, and hypercoagulability—collectively described by Virchow's triad. The incidence of DVT in post-stroke patients has been reported with a wide range from 2% to over 50%, depending on the population studied, methods of diagnosis, and prophylaxis administered.

Previous studies have shown that most DVT events in stroke patients occur within the first two weeks post-admission, frequently affecting the paralyzed limb.

In low- and middle-income countries, where diagnostic and prophylactic resources may be limited, understanding the epidemiology and risk profile of DVT in stroke populations becomes critical. This study was conducted in a tertiary care hospital in

North India to evaluate the prevalence of DVT among acute stroke patients, and to examine associations with demographic, clinical, and laboratory parameters.

### Materials and Methods

**"Study Design and Setting:** This hospital-based cross-sectional study was conducted in the Postgraduate Department of Medicine, Government Medical College, Srinagar, Jammu and Kashmir, India,"

"over a period of two and a half years (2019–2021).\n\n"

**"Study Population:** A total of 120 patients admitted with acute stroke within two weeks of onset were enrolled after obtaining informed consent. Patients were aged over 20 years and had a muscle power  $\leq 3/5$  during the hospital stay.\n\n"

**"Exclusion Criteria:** Patients who refused consent, those on anticoagulant therapy, with known thrombophilic conditions, malignancy, or prior bedridden status were excluded.\n\n"

**"Methodology:** Detailed clinical examination and relevant laboratory investigations were performed,

including complete blood count, random blood sugar, renal function tests, ECG, echocardiography, and D-dimer." "Stroke was classified as ischemic or hemorrhagic based on neuroimaging. Doppler ultrasonography of lower limb veins was conducted on admission, on day 28, and symptomatically in between."

"Prophylactic measures included leg elevation in all patients; ischemic stroke patients received LMWH/UFH, whereas hemorrhagic stroke patients received leg elevation only."

### Results

A total of 120 patients admitted with acute stroke were included. The demographic and clinical characteristics are as follows:

- **Mean age:** 65.6 years
- **Gender:** 86 males (72%) and 34 females (28%)
- **Stroke type:** Hemorrhagic in 80 patients (66.7%), ischemic in 40 patients (33.3%)

### Prevalence of DVT

Out of 120 patients, 6 patients (5%) were diagnosed with deep venous thrombosis (DVT) during their hospital stay.

### DVT and Stroke Type

- All cases of DVT occurred in hemorrhagic stroke patients (6 out of 80; 7.5%)
- No cases of DVT occurred in ischemic stroke patients
- The difference, while not statistically significant ( $p = 0.075$ ), suggests a trend toward higher risk in hemorrhagic stroke

### Timing of DVT Development

- 3 patients developed DVT by Day 7
- 2 patients developed DVT between Day 8–14
- 1 patient developed DVT on Day 16
- All DVTs occurred within 16 days of stroke onset

### DVT Location and Limb Involvement

- All DVTs occurred in the paralyzed limb
- 83.3% (5/6) were distal DVTs; 16.7% (1/6) was proximal
- All patients with DVT had a muscle power  $\leq 2/5$

### D-Dimer and Other Risk Factors

- Mean D-dimer level in DVT patients: 5.38 ng/mL
- In non-DVT patients: 0.7 ng/mL
- All DVT patients were hypertensive and diabetic
- 66.7% of DVT cases were female, despite overall male predominance in the sample

### Prophylaxis

- All ischemic stroke patients received UFH/LMWH and leg elevation
- Hemorrhagic stroke patients received leg elevation only
- None of the DVT cases occurred in the anticoagulated (ischemic) group

### Discussion

This study found a 5% prevalence of deep venous thrombosis in patients admitted with acute stroke. All cases of DVT occurred in patients with hemorrhagic stroke, affecting the paralyzed limb and presenting within the first 16 days of hospital admission.

These findings are consistent with studies by Tan et al. (4.8%), El Rashedy et al. (6.66%), and Ji et al. (7.5%), suggesting that the DVT prevalence in South Asian stroke populations is within a similar range, albeit lower than Western cohorts where rates may exceed 10–20%.

A key observation in this study is that all DVT cases occurred in patients with hemorrhagic stroke. This aligns with studies by Gregory et al. and Ruijun Ji et al., which reported a significantly higher risk of VTE in hemorrhagic stroke, potentially due to:

- Limited use of anticoagulation prophylaxis
- Greater neurological deficits and immobilization
- Higher D-dimer and procoagulant activity

This creates a therapeutic dilemma: while anticoagulation can prevent DVT, it risks hematoma expansion in hemorrhagic stroke.

Thus, many centers, including the one in this study, avoid chemoprophylaxis in hemorrhagic stroke. Studies like those by Qiyang Cai et al. and Prabhakaran et al. advocate cautious, individualized initiation of anticoagulation in stable hemorrhagic stroke patients, ideally guided by imaging.

Another finding is the strong association of DVT with reduced limb power and D-dimer elevation. This highlights the importance of vigilant DVT screening in severely paralyzed stroke patients and those with elevated D-dimer levels.

The paralyzed limb was the site of all DVTs, reinforcing earlier observations that loss of calf muscle pump function and venous stasis are significant contributors to thrombus formation. Distal DVTs were most common, consistent with studies using ultrasonography rather than venography or nuclear scans, which are more sensitive for calf thrombi.

Comorbidities such as diabetes, hypertension, and obesity also correlated with DVT in this study, in line with the global literature.

### Conclusion

This hospital-based study demonstrates that deep venous thrombosis (DVT) is a relevant complication in 5% of patients with acute stroke, with significantly higher occurrence in patients with hemorrhagic stroke, particularly those with reduced limb power, advanced age, diabetes, and hypertension.

All DVTs developed in the paralyzed limb and occurred within the first 16 days of stroke onset, underscoring the importance of early and vigilant screening. The exclusive occurrence of DVT in the non-anticoagulated group (hemorrhagic stroke) raises crucial questions about optimizing thromboprophylaxis in this subset, balancing efficacy and safety.

While mechanical prophylaxis (e.g., leg elevation) was used in all patients, chemoprophylaxis with LMWH/UFH in ischemic stroke patients appeared protective, as no DVT cases were reported in this group. There is a need for larger, multicentric studies and possibly randomized controlled trials to define safe and effective DVT prevention strate-

gies, particularly in haemorrhagic stroke populations.

### References

1. Tan SS, et al. *J Neurol Sci.* 2007; 258(1):50-4.
2. Abdel-Aziz A, et al. *Egypt J Neurol Psychiatry Neurosurg.* 2015.
3. Ji R, et al. *Stroke.* 2013; 44(12):3273-80.
4. Gregory PC, et al. *Am J Phys Med Rehabil.* 2003; 82(10):812-6.
5. Kelly J, et al. *Stroke.* 2001; 32(2):356-62.
6. Prabhakaran S, et al. *J Stroke Cerebrovasc Dis.* 2012; 21(7):550-5.
7. Cai Q, et al. *Front Neurol.* 2020; 11:967.
8. Landi G, et al. *Stroke.* 1990; 21(9):1198-202.
9. Warlow C, et al. *Lancet.* 1976; 2(7986):1305-6.
10. Dennis M, et al. *Lancet.* 1997; 349(9060):1567-71.
11. Brandstater ME, et al. *Arch Phys Med Rehabil.* 1983; 64(10):423-6.
12. Bembenek JP, et al. *J Thromb Thrombolysis.* 2011; 31(1):71-6.