


## Letter to the Editor

**Cite this article:** Furukawa Y, Kobayashi T, Koami H, Sakamoto Y. Deep vein thrombosis in the aftermath of earthquakes: Differences by country and screening location in factors that may cause significant heterogeneity. *Disaster Med Public Health Prep.* 17(e543), 1. doi: <https://doi.org/10.1017/dmp.2023.210>.

**Corresponding author:** Takaomi Kobayashi; Email: [takaomi\\_920@yahoo.co.jp](mailto:takaomi_920@yahoo.co.jp).

# Deep Vein Thrombosis in the Aftermath of Earthquakes: Differences by Country and Screening Location in Factors That May Cause Significant Heterogeneity

Yutaro Furukawa MD<sup>1</sup>, Takaomi Kobayashi MD<sup>2</sup> , Hiroyuki Koami MD, PhD<sup>1</sup> and Yuichiro Sakamoto MD, PhD<sup>1</sup>

<sup>1</sup>Department of Emergency and Critical Care Medicine Faculty of Medicine, Saga University, Saga, Japan and

<sup>2</sup>Department of Orthopaedic Surgery, Faculty of Medicine, Saga University, Saga, Japan

Dear Editor,

The interesting article by Sahebi et al.<sup>1</sup> compiled evidence on deep vein thrombosis (DVT) rates among earthquake survivors. They concluded that DVT rates are higher among earthquake victims than those of other disaster types. Their study offers valuable insights into this critical subject, but there is significant heterogeneity in both the overall analysis ( $I^2 = 97.9\%$ ;  $P < 0.001$ ) and subgroups, including the general population ( $I^2 = 98.0\%$ ;  $P < 0.001$ ) and patient survivors ( $I^2 = 77.7\%$ ;  $P = 0.001$ ). We have identified 2 factors that may explain at least some of this heterogeneity.

First, the study included data from 4 countries (Japan, Pakistan, China, and Nepal). Genetic variation in factors such as PROS1, PROC, SERPINC1, factor V Leiden, prothrombin G20210A, and protein S mutation K196E,<sup>2</sup> and differences in earthquake frequency, demographics, emergency preparedness, and health-care infrastructure may exist among these nations, contributing to variation in DVT rates, even within each country. Indeed, DVT rates ranged from 0.94% to 34.2% in Japan, 1.5% to 4.8% in Pakistan, 0.2% in China, and 6.0% in Nepal. It is important to note that only studies involving Asian subjects were included, and DVT rates of other ethnicities remain unknown.

Second, the study merged reports that covered different screening locations. For instance, Ueda et al.<sup>3</sup> focused on 190 admitted patients diagnosed with pulmonary thromboembolism 1 mo after an earthquake (mean age, 70.1 y; female, 137 [73.3%]) and reported DVT rates of 34.2%. Rathore et al.<sup>4</sup> investigated 187 earthquake survivors with spinal cord injuries (mean age, 28.3 y; female, 107 [57.2%]) and found DVT rates of 4.8%. Additionally, factors such as the length of hospital stay and implementation of prophylactic measures were not standardized across these studies.<sup>3,4</sup> Unlike these studies, Shibata et al.<sup>5</sup> targeted 269 evacuees in shelters 1 mo after an earthquake (mean age, 70.6 y; female, 174 [64.7%]) and observed DVT rates of 24.2%.

Despite problems inherent to systematic reviews and meta-analyses, the study of Sahebi et al.<sup>1</sup> is valuable because it illuminates DVT risks among earthquake survivors. Future studies need to perform more detailed subgroup analyses, ie, meta-analysis and meta-regression, conducted by country or screening location. Factors such as hospitalization with spinal cord injury, hospitalization with pulmonary thromboembolism, earthquake magnitude, injuries, evacuation to temporary housing in houses or shelters, or sheltering in cars after an earthquake should be examined to further enhance our understanding of the complex relationship between earthquakes and DVT.

**Funding.** No funding was available for this manuscript.

**Competing interests.** The authors declare that they have no conflicts of interest.

## References

1. Sahebi A, Nejati-Zarnaqi B, Vasei N, et al. Deep vein thrombosis after earthquake: a systematic review and meta-analysis. *Disaster Med Public Health Prep.* 2023;17:e304.
2. Miyata T, Sato Y, Ishikawa J, et al. Prevalence of genetic mutations in protein S, protein C and antithrombin genes in Japanese patients with deep vein thrombosis. *Thromb Res.* 2009;124(1):14-18.
3. Ueda S, Hanzawa K, Shibata M. One-year overview of deep vein thrombosis prevalence in the ishinomaki area since the great East Japan earthquake. *Ann Vasc Dis.* 2014;7(4):365-368.
4. Rathore MFA, Hanif S, New PW, et al. The prevalence of deep vein thrombosis in a cohort of patients with spinal cord injury following the Pakistan earthquake of October 2005. *Spinal Cord.* 2008;46(7):523-526.
5. Shibata M, Hanzawa K, Ueda S, et al. Deep venous thrombosis among disaster shelter inhabitants following the March 2011 earthquake and tsunami in Japan: a descriptive study. *Phlebology.* 2014;29(4):257-266.