



Post-traumatic stress disorder was associated with a threefold increased risk for stroke in a Taiwanese National Health Insurance Database

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ABSTRACT FROM: Chen MH, Pan TL, Li CT, *et al.* Risk of stroke among patients with post-traumatic stress disorder: nationwide longitudinal study. *Br J Psychiatry* 2015;206:302–7.

WHAT IS ALREADY KNOWN ON THIS TOPIC

People with post-traumatic stress disorder (PTSD) are more likely to have psychiatric comorbidities and cardiovascular risk factors, including diabetes mellitus, hypertension, smoking and dyslipidemia.^{1 2} While stroke can trigger PTSD,³ prior to this study it was not known whether PTSD increases the risk for stroke.

METHODS OF THE STUDY

This was a longitudinal follow-up study to assess for development of stroke (International Classification of Diseases, ninth edition (ICD-9) codes 430–438). The data for this study was obtained from National Health Insurance Research Database (NHIRD), which includes health-care data from >97% of Taiwan's population (>23 million people).⁴ Comprehensive information on insured individuals is included in the database, including demographic data, dates of clinical visits and disease diagnoses. Individuals in the NHIRD aged 18 years or over with no history of stroke were enrolled at the time of diagnosis of PTSD (ICD-9 code 309.81 entered by a psychiatrist) from 2002 to 2009 (n=5217) and were compared to a control group of 20 868 age-matched and gender-matched controls with no history of PTSD or stroke. For between-group comparisons, t test was used for continuous variables and Pearson's χ^2 test for nominal variables. Cox regression models were used to determine HRs. The outcome was occurrence of stroke, only when ICD-9 codes 430–438 were entered by neurologists, neurosurgeons or emergency room physicians after brain imaging.

WHAT DOES THIS PAPER ADD

- ▶ People with PTSD had a threefold increased risk for all strokes (HR=3.37, 95% CI 2.44 to 4.67) and ischaemic strokes (HR=3.47, 95% CI 2.23 to 5.39), even after adjusting for confounders such as demographics (age, sex, urban vs rural, income) and comorbidities (depression, hypertension, diabetes, dyslipidemia, ischaemic heart disease) and excluding the first year after PTSD diagnosis (HR 3.02 for all strokes, 2.89 for ischaemic strokes).
- ▶ PTSD was not associated with haemorrhagic stroke after adjusting for demographic data and medical comorbidities (HR=1.35, 95% CI 0.54 to 3.37).
- ▶ In the PTSD group, strokes occurred at a younger age (55.9 vs 63.0 years, $p=0.001$).
- ▶ Young adults (<40 years) with PTSD had the highest risk for incident stroke, both compared to the control group (1.21 vs 0.19 per 1000 person years, $p<0.001$) and when compared to older adults with PTSD, albeit with wide CIs. This is notable because in other populations, age is a risk factor for stroke.

LIMITATIONS

- ▶ Diagnoses were based on billing codes, which may be inaccurate. However, inaccuracies were minimised by only including PTSD when coded by a psychiatrist and only including stroke when coded by a

neurologist, neurosurgeon or emergency physician after brain imaging was performed.

- ▶ The database did not capture triggers for PTSD or PTSD severity, which may impact results.
- ▶ Results may not be generalisable to populations outside of Taiwan, with different PTSD triggers.
- ▶ Although the model adjusted for diabetes, hypertension and dyslipidemia, it could not adjust for cardiovascular risk factors not captured by the NHIRD, including smoking, family history, obesity and sedentary lifestyle.
- ▶ This study does not identify a mechanism for the increased risk of stroke with PTSD.

WHAT NEXT IN RESEARCH

Future research should focus on identifying a mechanism for the relationship between PTSD and stroke and treatment. A long-term, prospective study of patients with PTSD that collects data on PTSD triggers and severity, psychiatric and medical comorbidities and also measures activity of the hypothalamic–pituitary–adrenal axis and pro-inflammatory cytokines, may help point to a mechanism. A randomised study of different treatment modalities for PTSD may help identify whether PTSD is a modifiable risk factor, whether treating PTSD can lower stroke risk, and which treatment modality is most effective.

DO THESE RESULTS CHANGE YOUR PRACTICES AND WHY?

On the basis of this study and other research,⁵ PTSD is associated with increased risk of stroke. As young adults were at highest risk, prevention is critical. Looking forward, I will now counsel patients with PTSD on their increased cardiovascular risk and aggressively manage modifiable risks, such as hypertension, smoking, diabetes, obesity and dyslipidemia. I will refer appropriate patients for psychiatric care to help with symptoms of PTSD, but I will inform them that it is unknown if treatment lowers stroke risk.

Competing interests None declared.

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