Depression Is Associated with a Higher Risk of Death among Stroke Survivors

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Background: Poststroke depression is common, affecting approximately 1 in 3 stroke survivors. We aimed to evaluate the association between depression and mortality in adults with and without prior stroke. Methods: Using the National Health and Nutrition Examination Survey (NHANES) I Epidemiologic Follow-up Study (1982-1992), we investigated the association between depression and all-cause mortality among adults aged 25-74 years with and without prior stroke, and stroke mortality among stroke survivors, adjusting for covariates. Results: Among 9919 individuals, 121 (1.2%) reported prior stroke. The adjusted depression prevalence was 37.1% among stroke survivors and 17.3% among individuals without stroke. In persons aged 25-64 years, neither stroke nor depression was associated with all-cause mortality. The combination of depression and stroke was not associated with all-cause mortality (adjusted hazard ratio [HR] 2.83, 95% confidence interval [CI] 0.67-12.04). Among persons aged 65-74 years, depression alone (adjusted HR 1.24, 95% CI 1.04-1.47), stroke alone (adjusted HR 1.64, 95% CI 1.17-2.32), and the combination of depression and stroke (adjusted HR 2.28, 95% CI 1.79-2.90) were associated with all-cause mortality, consistent with an additive relationship. Among all ages, the combination of depression and stroke was associated with all-cause mortality (adjusted HR 1.93, 95% CI 1.28-2.92). Higher stroke mortality was only observed in those aged 65-74 years (adjusted HR 2.43, 95% CI 1.05-5.60). Compared with stroke survivors without depression, those with depression were ~35 times more likely to die from a stroke (adjusted HR 35.33, 95% CI 7.79-160.32). Conclusions: The combination of prior stroke and depression is associated with higher all-cause mortality than either condition alone. The presence of depression after stroke increases stroke mortality 35-fold, highlighting the importance of identifying and treating depression among stroke survivors. Key Words: Depression—stroke—mortality—stroke mortality—death—outcome.

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Introduction

Depression is a common yet often unrecognized condition in individuals with stroke, affecting approximately one third of stroke survivors. Depression is associated with poorer functional outcomes after stroke. Individuals with poststroke depression (PSD) appear to have a higher mortality than stroke survivors without depression; however, previous studies are difficult to interpret given the heterogeneity in recruited populations, the sample size, the definition of PSD, covariates, and the duration of follow-up. In addition, it is unclear whether depression has a stronger effect on mortality in stroke survivors than in individuals without a stroke. Whereas some authors have suggested that PSD may contribute to mortality by affecting behavioral factors such as lifestyle patterns and adherence to secondary stroke prevention medications, others have suggested physiological mechanisms. A recent longitudinal cohort study suggested that the association between PSD and mortality was strongest in individuals younger than 65 years of age; however, that finding has not been validated in other studies to date.

In the present study, we aimed to examine the association between depression and all-cause and stroke mortality among individuals with and without a self-reported history of stroke in a large nationwide representative sample of adults, stratified by age (25-64 versus 65-74 years), to determine if depression has a stronger effect on mortality among stroke survivors compared with those without a stroke, and to further characterize the relationship between PSD and mortality.

Methods

Study Design

The National Health and Nutrition Examination Survey (NHANES) I (National Center for Health Statistics 1973) was used to perform a retrospective, longitudinal study of a population cohort. NHANES I was conducted between 1971 and 1975 using questionnaires of health topics and included 20,729 individuals aged 25-74 years with 14,407 (70%) medically examined. Populations oversampled included individuals living in poverty areas, women of childbearing age, and the elderly (≥65 years). The NHANES I Epidemiologic Follow-up Study (NHEFS) is a longitudinal study of participants who were between 25 and 74 years old during 1971-1975. The study follow-up began in 1982 and continued in 1986, 1987 and 1992. The 1982 follow-up included data on self-reported medical conditions and a depression assessment using the Center for Epidemiologic Studies Depression (CES-D) scale. In the present study, we examined data on individuals in the NHEFS sample who completed the CES-D in 1982 and who were then followed up until 1992.

We examined the association between the presence of depressive symptoms versus (1) all-cause mortality and (2) stroke mortality in persons with and without a history of stroke.

Depression Scale

The CES-D is a validated, reliable assessment of depression in population samples. The presence of depressive symptoms was determined using the 20-item version of the CES-D scale, with each item rated on a 4-point scale ranging from 0 (rarely or none of the time) to 3 (most or all of the time). Scoring of positive items (4, 8, 12, and 16) was reversed before scores for the 20 items were summed. The total scores ranged 0-60 with 16 or higher as a cutoff for depression, and higher scores indicate more symptoms of depression. A cutoff score of 16 or higher has been used extensively in distinguishing depressed patients.

Although the optimal screening tool for PSD is unclear, a meta-analysis of 24 studies through November 2012 showed that the CES-D was 1 of the 3 optimal screening tools for PSD, with a sensitivity of .75 (95% confidence interval [CI] .60-.85) and a specificity of .88 (95% CI .71-.95).

Study Sample

From 14,407 individuals eligible for inclusion in NHEFS, 12,220 individuals were interviewed between 1982 and 1984. Of the 12,220 individuals who were interviewed, 2,294 did not have CES-D data and an additional 7 had an unknown stroke status and were excluded, leaving 9919 for the final analysis. Our study sample included all adult participants of NHANES I who were still alive and were interviewed between 1982 and 1984, and who had complete data for the CES-D scale. Individuals who did not have complete CES-D data or had missing stroke history data were excluded. History of stroke and medical comorbidities were determined by self-report. The diagnosis of stroke was based on a “yes” response to the following question: “Did a doctor ever tell you that you had any of the following conditions: Small stroke sometimes known as TIA (transient ischemic attack), stroke (sometimes called a CVA).” A similar approach was utilized to establish a diagnosis of other self-reported medical conditions. The study sample was divided into 4 groups based on the self-reported stroke and depression defined as CES-D score of 16 or higher in 1982-1984 as follows: (1) no stroke, no depression (reference); (2) stroke, no depression; (3) no stroke, depression; and (4) both stroke and depression.

Outcome Measures

The main outcome measures were all-cause mortality and stroke mortality across the 4 groups in the study sample. Follow-up data were collected during the following time periods: 1982-1984, 1986, 1987, and 1992. Follow-up length was calculated from the date of the baseline interview in 1982-1984 to either the date of death.
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