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Associations between DSM-IV mental disorders and subsequent non-fatal, self-reported stroke

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ABSTRACT

Objectives: To examine the associations between a wide range of mental disorders and subsequent onset of stroke. Lifecourse timing of stroke was examined using retrospectively reconstructed data from cross-sectional surveys.

Methods: Data from the World Mental Health Surveys were accessed. This data was collected from general population surveys over 17 countries of 87,250 adults. The Composite International Diagnostic Interview retrospectively assessed lifetime prevalence and age at onset of DSM-IV mental disorders. A weighted subsample (n = 45,288), was used for analysis in the present study. Survival analyses estimated associations between first onset of mental disorders and subsequent stroke onset.

Results: Bivariate models showed that 12/16 mental disorders were associated with subsequent stroke onset (ORs ranging from 1.6 to 3.8). However, after adjustment for mental disorder comorbidity and smoking, only significant relationships between depression and stroke (OR 1.3) and alcohol abuse and stroke (OR 1.5) remained. Among females, having a bipolar disorder was also associated with increased stroke incidence (OR 2.1). Increasing number of mental disorders was associated with stroke onset in a dose–response fashion (OR 3.3 for 5+ disorders).

Conclusions: Depression and alcohol abuse may have specific associations with incidence of non-fatal stroke. General severity of psychopathology may be a more important predictor of non-fatal stroke onset. Mental health treatment should be considered as part of stroke risk prevention. Limitations of retrospectively gathered cross sectional surveys design mean further research on the links between mental health and stroke incidence is warranted.

Introduction

Stroke is the leading cause of acquired disability in adults, and also a leading cause of death [1,2]. Despite the recent advent of improved treatment for survivors of stroke, prevention remains the best approach for reducing the burden of stroke [3,4]. Recent evidence suggests stroke rates are declining [5,6] and this has been attributed to increasing

Abbreviations: CIDI, Composite International Diagnostic Interview; DSM-IV, Diagnostic and Statistical Manual of Mental Disorders; WMH, World Mental Health; OR, odds ratio.

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success in treating hypertension, in combination with diabetes and high cholesterol control and smoking cessation [7].

Many risk factors for stroke have been studied and quantified. Hypertension accounts for between 52% [8] and 80% of the risk [9] while smoking contributes between 12% [10] and 19% [8] of the risk of stroke. Other contributing factors are: high cholesterol [11–13], physical activity [8,9,1,12], alcohol [8,11,12], heart disease [9,13], diabetes [8,9,12,13], obesity [9,11,13], psychosocial factors [8,9] and, diet [8,9,11].

There is also a well established relationship between depression and incident stroke [14]. Adding to that body of evidence, a recent prospective study found a two-fold increased risk of first ever stroke associated with prior depression, after controlling for confounders [15]. Another recent study reported a 70% increased risk for stroke following depression [16]. There has been limited research into the contribution of anxiety disorders and stroke incidence [17]. A recent review found that while the link between anxiety and heart disease was well established the link between anxiety and stroke was less clear with fewer studies and conflicting results [18]. A key limitation of the majority of prior studies on depression and anxiety is that they have used symptom screening scales rather than diagnostic measures of mental disorders; a review in the area suggests that more research with diagnostic measures of mental disorders is needed [19] in order to establish whether depression and anxiety both contribute to the risk of stroke after controlling for their comorbidity, and whether other mental disorders, including substance use disorders, might also elevate stroke risk.

The rationale for a focus on mental disorders is that like hypertension, they may form a further potentially modifiable group of risk factors for stroke. American Stroke Association Guidelines in the prevention of stroke do not consider mental disorders at all [4]. Treatment of mental disorders may have a direct effect on stroke reduction, and also an indirect effect as they may influence the other known direct modifiable factors. It is possible using the present dataset to examine direct effects of mental health disorders while controlling for known mediators such as smoking, gender and hypertension. Although alcohol consumption is known to influence the risk of stroke, alcohol use disorders have not been studied as risk factors for incident stroke. Evidence regarding alcohol use and stroke suggests that low-level consumption may offer some protection from ischaemic stroke, at the same time increasing the risk of hemorrhagic stroke. Increasing consumption increases all types of stroke risk, as well as other types of cardiovascular disease [20].

The present study uses the cross-national World Mental Health (WMH) Surveys dataset to examine associations between a range of DSM-IV mental disorders and subsequent non-fatal stroke. The WMH surveys are general population surveys that retrospectively assessed lifetime history of DSM-IV mental disorders and also obtained self-report of diagnosis of selected chronic physical conditions including stroke. The surveys are cross-sectional in design, but collected information on onset timing of mental disorders and physical conditions, which allows the use of survival analysis to examine associations between temporally prior mental disorders (retrospectively reported) and the subsequent onset of non-fatal stroke, examining the influence of specific disorders as well as the cumulative influence of multiple disorders.

Method

Samples and procedures

This study uses data from 17 of the WMH surveys (see Table 1). This included all surveys that had included a question specifically on stroke. A stratified multi-stage clustered area probability sampling strategy was used to select adult respondents (18 years +) in most WMH countries. Most of the surveys were based on nationally representative household (or population register) samples while Colombia, and Mexico were based on nationally representative household samples in urbanized areas. All interviews were carried out by trained lay interviewers. In most countries, internal subsampling was used to reduce respondent burden and average interview time by dividing the interview into two parts. All respondents completed Part 1, which included the core diagnostic assessment of most mental disorders. All Part 1 respondents who met lifetime criteria for any mental disorder and a probability sample of other respondents were administered Part 2, which assessed physical conditions and collected a range of other information related to survey aims. Part 2 respondents were weighted by the inverse of their probability of selection for Part 2 of the interview to adjust for differential sampling.

Analyses in this paper are based on the weighted Part 2 subsample ($n = 45\,288$). Additional weights were used to adjust for differential probabilities of selection within households, to adjust for non-response, and to match the samples to population sociodemographic distributions. Measures taken to ensure data accuracy, cross-national consistency and protection of respondents are described in detail elsewhere [21,22]. All respondents provided written informed consent and procedures for protecting respondents were approved and monitored for compliance by the Institutional Review Boards in each country (see [22] for details).

Measures

Mental disorders

All surveys used the WMH survey version of the WHO Composite International Diagnostic Interview (now CIDI 3.0) [21], a fully structured interview, to assess lifetime history of mental disorders. Disorders were assessed using the definitions and criteria of the DSM-IV. The mental disorders included in this paper are: *mood disorders* (major depressive disorder/dysthymia, bipolar broad (I, II and subthreshold)); *anxiety disorders* (panic disorder, agoraphobia without panic, specific phobia, social phobia, post-traumatic stress disorder, generalized anxiety disorder, obsessive compulsive disorder); *impulse control disorders* (intermittent explosive disorder, bulimia nervosa and binge eating disorder); and, *substance use disorders* (alcohol abuse and dependence, drug abuse and dependence). CIDI organic exclusion rules were applied in making diagnoses. Clinical reappraisal studies conducted in some of the WMH countries indicate that lifetime diagnoses of anxiety, mood and substance use disorders based on the CIDI have generally good concordance with diagnoses based on blinded clinical interviews [23].

Stroke

In a series of questions adapted from the U.S. Health Interview Survey [24], respondents were asked about the lifetime presence of selected chronic conditions. Respondents were asked: "Have you ever had a stroke"? If respondents endorsed this question they were classified as having a history of stroke for these analyses. Respondents were also asked how old they were when their stroke first occurred. Only adult-onset stroke (onsets age 21 +) and non-fatal stroke were investigated in this paper.

Covariates

Covariates included in this analysis are current age, person-years (see below), age cohort (up to 52 years, 53–62, 63–71 and 72 +, which represent quartiles of stroke onset distribution), gender, education (years) and smoking (never/ever/current).

Statistical analysis

Discrete-time survival analyses [25] with person-year as the unit of analysis were used to investigate sequential associations between first onset of mental disorders and the subsequent onset of stroke. For these analyses a person-year dataset was created in which each year in the life of each respondent up to and including the age of first stroke or their age at interview (whichever came first) was treated as a separate observational record, with the year of stroke coded 1 and

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