ORIGINAL RESEARCH

Risk Factors for Symptoms of Depression and Anxiety One Year Poststroke: A Longitudinal Study

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Abstract

Objective: To estimate the relative contribution of psychological factors next to sociodemographic and premorbid/stroke-related factors to the risk of developing symptoms of depression and anxiety after stroke.

Design: Multicenter, longitudinal cohort study.

Setting: Patients after stroke from 6 general hospitals.

Participants: Patients (N=331) were included at stroke onset and followed up 2 and 12 months after stroke.

Interventions: Not applicable.

Main Outcome Measures: Sociodemographic and premorbid/stroke-related information was recorded during hospital admission, whereas psychological characteristics were determined with postal questionnaires 2 months poststroke. Symptoms of depression and anxiety were assessed with the Hospital Anxiety and Depression Scale (HADS) 2 and 12 months poststroke. Multivariable logistic analysis was performed to analyze the influence of sociodemographic, premorbid/stroke-related, and psychological characteristics on depressive symptoms (depression subscale of HADS >7) and symptoms of anxiety (anxiety subscale of HADS >7) 1 year after stroke.

Results: Early depression, stroke severity, posterior cerebral artery stroke, and neuroticism independently explained the variance of depressive symptoms 1 year poststroke (discriminative power, 83%; adjusted R^2 value, 36%). Neuroticism and early anxiety independently explained the variance of symptoms of anxiety 1 year poststroke (discriminative power, 88%; adjusted R^2 value, 44%). Based on these predictive models, nomograms were constructed to visually reflect the individual contribution of each risk factor to the development of long-term mood disorders after stroke.

Conclusions: Psychological characteristics are important risk factors for poststroke symptoms of depression and anxiety.

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Mood disorders are very common after stroke, with prevalence estimates varying from 31% to 38% for both depressive symptoms and symptoms of anxiety.[1,2] Moreover, poststroke depression and anxiety often co-occur.[2-6] Recent studies[7-10] indicate that poststroke depression is associated with reduced therapy compliance,

poorer functional outcome, higher medical costs, reduced social participation, and increased mortality, while poststroke anxiety and depression have both been associated with a lower quality of life.[2,7] In this perspective, knowledge about risk factors is essential for long-term prevention and treatment of mood disorders poststroke.

The risk factors for mood disorders after stroke that have been reported in the literature are mainly "sociodemographic,"

"premorbid," and "stroke related." The most frequently reported risk factors for depressed mood are female sex, stroke severity (in terms of functional consequences), lack of social support, and a history of depression.[11,12] Although less frequently investigated, the reported risk factors for poststroke anxiety are female sex, age <65 years, stroke severity, inability to work, prestroke treatment of depression, and smoking.[2] Unfortunately, because of the methodology used in these studies, little is known about the strength of prediction of poststroke mood disorders based on the abovementioned sociodemographic, premorbid, and stroke-related characteristics.[2,12] Moreover, the aforementioned risk factors are mostly not amendable.

There are indications that mood disorders after stroke are greatly determined by an individual's ineffective cognitive and emotional adjustment to the consequences of stroke[13,14] and, thus, may have an important psychological origin. The Common Sense Model of Levental[15] suggests that patients create mental representations of their illness when faced with a chronic disease. The ineffective cognitive and emotional adjustments to the consequences of stroke are expressed in (1) "illness cognitions," the way patients perceive their illness and its (uncontrollable) consequences; (2) the worries and fears that come along with this adjustment to a new situation; and (3) the concurrent behavior or coping strategies patients attend to. In addition, a person's stable characteristics, such as personality traits, are assumed to influence this adjustment process. Previous studies[16-19] showed that neuroticism was indeed associated with poststroke depression. In another study,[20] avoidance coping was associated with the severity of depressive symptoms after stroke. Unfortunately, these psychologically oriented studies were small (n≤61),[16,17,20] used a cross-sectional design,[16-18,21] or regarded a limited set of psychological characteristics only.[16,17,19]

Hence, we conducted a longitudinal cohort study to explore possible risk factors for developing depressive symptoms and symptoms of anxiety 1 year after stroke, as part of the Restore4Stroke Cohort study in the Netherlands.[22] We hypothesized that psychological factors would be important in addition to previously established sociodemographic, premorbid, and stroke-related characteristics. Moreover, we aimed to determine the predictive strength of each of these characteristics with regard to symptoms of depression and anxiety 1 year poststroke. If an important role for psychological factors can be demonstrated, this would support the application of psychological treatment to prevent or treat poststroke mood disturbances.

List of abbreviations:

AUC	area under the curve
BI	Barthel Index
CI	confidence interval
HADS	Hospital Anxiety and Depression Scale
HADS-A	anxiety subscale of Hospital Anxiety and Depression Scale
HADS-D	depression subscale of Hospital Anxiety and Depression Scale
NIHSS	National Institutes of Health Stroke Scale
OR	odds ratio
UCL-P	Utrecht Coping List passive coping scale
UPCC	Utrecht Proactive Coping Competence list

Methods

Participants

Patients were recruited at stroke units of 6 participating general hospitals in the Netherlands from March 2011 until March 2013.[22] Patients were eligible if (1) they signed informed consent within the first week poststroke; (2) the diagnosis of cerebral stroke (ischemic or hemorrhagic) was clinically confirmed; (3) they were aged ≥18 years; and (4) they had sufficient knowledge of the Dutch language to complete the planned assessments. Exclusion criteria were (1) any serious comorbid condition that might influence study outcomes; (2) prestroke dependency in activities of daily living as defined by a Barthel Index (BI) ≤17[22,23]; and (3) prestroke cognitive impairments as defined by a score ≥1 on the Heteroanamnesis List Cognition.[24] The study was approved by the medical ethical committee of the St. Antonius Hospital in Nieuwegein as well as by the medical ethics board of each of the other participating hospitals.

Design and procedure

Patients were assessed within 1 week poststroke ("stroke onset") as well as 2 and 12 months later. Sociodemographic information was provided by patients or patients' family members at inclusion during the first days of hospital admission. Most premorbid and stroke-related information was obtained from the medical files at inclusion by a specialized stroke nurse. The National Institutes of Health Stroke Scale (NIHSS) and the BI were recorded on day 4 after stroke. Collection of information about use of antidepressants and comorbidity was performed by a trained research assistant 2 months poststroke, as was the assessment of cognitive functioning. All potential psychological risk factors, including symptoms of depression and anxiety, were obtained by means of postal questionnaires 2 months poststroke. In addition, depressive symptoms and symptoms of anxiety were reassessed as outcomes 1 year poststroke by means of postal questionnaires.

Outcomes

Symptoms of depression and anxiety were assessed with the Hospital Anxiety and Depression Scale (HADS).[25-27] The HADS consists of 14 items and is divided into 2 subscales directed at either the depression subscale of Hospital Anxiety and Depression Scale (HADS-D) or the anxiety subscale of Hospital Anxiety and Depression Scale (HADS-A) (7 items per subscale; range, 0−21 on each subscale). According to the literature, both depression and anxiety may be defined by a HADS subscale score >7,[27] yet we will refer to depressive symptoms and symptoms of anxiety throughout this text. The HADS has demonstrated good psychometric properties, including good internal consistency, in patients with stroke.[28]

Potential risk factors

Sociodemographic

Information about sex (male/female), living together (yes/no), age (years), and level of education was obtained. The Dutch classification system of Verhage served as an indicator of the level of