Psychopathological evaluation and use of the Hospital Anxiety and Depression Scale in a sample of Brazilian patients with post-stroke depression

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Abstract

Background: Depression is the most frequent psychiatric complication of stroke and is often undetected or inadequately treated. Objective: This study aimed to characterize psychopathological aspects of Brazilian patients admitted to an acute stroke unit, and to evaluate the performance of the Hospital Anxiety and Depression Scale (HADS) in detecting cases of depression. Methods: This was a cross-sectional study. Sixty consecutive patients admitted to an acute stroke unit were assessed with the National Institutes of Health Stroke Scale, the Modified Rankin Scale, the Functional Independence Measure, the Mini International Neuropsychiatric Interview-Plus, the HADS, the Mini Mental State Examination (MMSE) and the Pathological Laughing and Crying Scale. Results: Prevalence of depression was 26.7%. Patients with post-stroke depression were more likely to present diabetes (p < 0.01) and had greater disability (p < 0.001) and cognitive impairment (p < 0.001) in comparison to non-depressed patients. Depressed patients showed worse performance specifically on tasks of attention/calculation and language of the MMSE. ROC curve analysis of HADS provided a cutoff value of 6 for detecting depression (sensitivity: 83.3%; specificity: 83.3%). The depression subscale of HADS (HADS-D) showed sensitivity of 100% and specificity of 99.17%. Discussion: HADS-D showed good performance in screening for depressive symptoms after acute stroke.


Keywords: Post-stroke depression, Hospital Anxiety and Depression Scale, Mini Mental State Examination, depression, acute ischemic stroke.

Introduction

Stroke is a major cause of death and disability worldwide1,6. Mood disorders, especially depression, are common in stroke survivors and are associated with morbidity and mortality2-3. A recent meta-analysis showed that the prevalence of depression any time after stroke was 29% and that more than half of stroke survivors will be affected by depression at some point1,5. Despite this, mood disorders after stroke are frequently undetected or inadequately treated4. Untreated post-stroke depression (PSD) lengthens hospital stays, impairs functional outcome and elevates mortality8-9.

Early assessment for possible neuropsychiatric disorders in acute stroke units could allow prompt intervention and provide valuable information for the referral of patients. Stroke survivors often report that their physical needs are prioritised over their psychological ones and this is a relevant issue, since many patients will probably not receive this type of evaluation after discharge7. The gold-standard method for psychiatric diagnosing is a standardized clinical interview by an experienced clinician. However, this is time consuming and mostly unavailable on neurological or medical wards. Therefore, there is a need for valid and reliable screening instruments in order to find vulnerable or at risk patients. Hospital Anxiety and Depression Scale (HADS), a simple instrument developed to identify caseness of anxiety and depression among patients in nonpsychiatric hospital clinics, could be potentially useful for screening depressive disorders after stroke6.

In Brazil, where stroke is the leading cause of death, it is estimated that survivors reach 2.5 million individuals and there is virtually no information on the profile of neuropsychiatric disorders in these patients8-9. Despite limited data on this topic, we recently reviewed Brazilian studies that assessed the prevalence of depression after stroke in different settings and found rates ranging from 20 to 59%10. However, there is very limited evidence on the use of screening instruments in this population.

Therefore, the objective of this study was to characterize psychopathological aspects of Brazilian patients admitted to an acute stroke unit, and to evaluate the performance of the HADS in detecting cases of depression in this sample of patients.

Methods

This was a cross-sectional study, in which consecutive patients with a diagnosis of acute ischemic stroke admitted to the Stroke Unit of the Hospital Municipal Odilon Behrens, Belo Horizonte, Brazil, underwent neuropsychiatric evaluation during the first week after stroke. We included patients of both genders, older than 45 years of age and who consented to participate. Individuals with hemorrhagic stroke, active infectious diseases, autoimmune diseases, acute recent myocardial infarction, dementia, decreased level of consciousness (Glasgow Coma Scale < 14), severe aphasia or who underwent recent neurosurgery were excluded.

In a semi-standardized interview, we collected data on sociodemographic and clinical characteristics of the participant. These variables were used to calculate the Framingham Risk Score for cardiovascular disease11. Stroke severity was quantified by using the National Institutes of Health Stroke Scale (NIHSS)12 and disability was assessed with the Modified Rankin Scale (mRS)13 and the Functional Independence Measure (FIM)14. Subsequently, patients were interviewed by a trained psychiatrist using the Mini International Neuropsychiatric Interview-Plus (MINI-Plus) – Brazilian version 5.0.0 to provide formal psychiatric diagnosis15. Finally, patients underwent psychopathological evaluation, through the use of HADS6, Mini Mental State Examination10 and Pathological Laughing and
Crying Scale (PLACS)\(^1\). Two weeks after the evaluation, patients were contacted by phone to ensure the stability of the diagnosis of depression in that period of time, based on the MINI-Plus mood disorders section.

Demographic and clinical variables between participants with and without the diagnosis of depression were compared by chi-square test, Mann-Whitney U test and Spearman correlation analysis. Receiver Operating Characteristic (ROC) curve analysis was calculated to identify optimal cut-off values for the diagnosis of depression with the HADS. Common language effect size (CLES) statistic was calculated according to the equation CLES = U/mn\(^18\). The level of significance was set at p < 0.05.

The study was approved by the local research ethics committee.

**Results**

**Sociodemographic and clinical features**

Sixty patients were enrolled in the study. Diagnosis of depression made by the use of MINI-Plus reached a prevalence of 26.7%. Diagnosis made in the stroke unit remained stable in all cases after two weeks. Two groups were divided based on the presence of depression, and their demographic and clinical features were compared (Table 1). No differences were observed with respect to age and gender. Depressed patients exhibited higher rate of diabetes, but did not differ in relation to the average values of body mass index (BMI) and waist circumference, as well as to the Framingham risk score. There were no differences regarding the presence of other medical comorbidities such as hypertension, dyslipidemia, obesity, myocardial infarction, smoking, heart failure or coronary artery disease (data not shown). Depressed patients showed higher mRS values on admission as well as worse functional performance as assessed by the FIM. A trend of higher score in NIHSS was observed among patients with depression, but this difference did not reach statistical significance (p = 0.062).

**Table 1. Sociodemographic and clinical features in a sample of 60 patients with acute ischemic stroke**

<table>
<thead>
<tr>
<th>Sociodemographic and clinical features</th>
<th>% or mean (standard deviation)</th>
<th>p value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Depression (n = 16)</td>
<td>No depression (n = 44)</td>
</tr>
<tr>
<td>Age (years)</td>
<td>61.07 (5.7)</td>
<td>65.38 (9.41)</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>75.00</td>
<td>68.18</td>
</tr>
<tr>
<td>Diabetes (%)</td>
<td>56.25</td>
<td>20.45</td>
</tr>
<tr>
<td>BMI (kg/m²)</td>
<td>25.43 (3.06)</td>
<td>26.70 (4.87)</td>
</tr>
<tr>
<td>Waist circumference (cm)</td>
<td>95.47 (10.41)</td>
<td>97.60 (14.41)</td>
</tr>
<tr>
<td>Framingham risk score</td>
<td>22 (0.85)</td>
<td>21 (3.80)</td>
</tr>
<tr>
<td>NIHSS</td>
<td>5.67 (4.21)</td>
<td>3.22 (2.34)</td>
</tr>
<tr>
<td>FIM</td>
<td>103.67 (14.12)</td>
<td>117.00 (9.93)</td>
</tr>
</tbody>
</table>

\(<\) Chi-square; \(<\) Mann-Whitney U test.

**Psychopathological features**

Table 2 presents the comparison of psychopathological characteristics between depressed and non-depressed patients. Patients with depression had poorer performance on the MMSE. Specifically, patients with PSD performed worse attention/calculation and language tasks (p = 0.001 and 0.049, respectively). Concerning the use of the HADS, depressed patients had higher scores in the total score and in the depression subscale, but did not differ in the anxiety subscale. In the assessment of involuntary emotional expression disorder (IEED) by the PLACS, no differences were observed between the groups, although there was a trend towards higher scoring among depressed patients. There was a positive correlation between the total scores of HADS and the PLACS (\(\rho = 0.322\), p = 0.025).

**Table 2. Psychopathological features in a sample of 60 patients with acute ischemic stroke**

<table>
<thead>
<tr>
<th>Psychopathological features</th>
<th>Mean (standard deviation)</th>
<th>p value</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Depression (n = 16)</td>
<td>No depression (n = 44)</td>
<td></td>
</tr>
<tr>
<td>MMSE Orientation</td>
<td>8.40 (1.59)</td>
<td>9.31 (1.79)</td>
<td>0.058</td>
</tr>
<tr>
<td>Registration</td>
<td>3.00 (0.00)</td>
<td>3.00 (0.00)</td>
<td>1.00</td>
</tr>
<tr>
<td>Attention and calculation</td>
<td>1.80 (0.94)</td>
<td>3.33 (1.68)</td>
<td>0.001</td>
</tr>
<tr>
<td>Recall</td>
<td>1.93 (0.70)</td>
<td>2.24 (1.09)</td>
<td>0.067</td>
</tr>
<tr>
<td>Language</td>
<td>6.87 (1.06)</td>
<td>7.38 (0.89)</td>
<td>0.049</td>
</tr>
<tr>
<td>Copying</td>
<td>0.40 (0.51)</td>
<td>0.53 (0.50)</td>
<td>0.375</td>
</tr>
<tr>
<td>Total</td>
<td>22.40 (1.96)</td>
<td>25.79 (2.90)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>HADS Total</td>
<td>13.50 (4.23)</td>
<td>5.69 (3.36)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>HADS Depression</td>
<td>10.08 (2.64)</td>
<td>2.36 (1.60)</td>
<td>&lt; 0.001</td>
</tr>
<tr>
<td>HADS Anxiety</td>
<td>3.42 (2.15)</td>
<td>3.53 (2.50)</td>
<td>0.744</td>
</tr>
<tr>
<td>PLACS Total</td>
<td>5.40 (7.05)</td>
<td>1.91 (4.80)</td>
<td>0.059</td>
</tr>
<tr>
<td>PLACS Crying</td>
<td>2.60 (5.03)</td>
<td>1.16 (3.48)</td>
<td>0.714</td>
</tr>
<tr>
<td>PLACS Laughing</td>
<td>1.80 (3.75)</td>
<td>0.38 (1.43)</td>
<td>0.105</td>
</tr>
</tbody>
</table>

Receiver Operating Characteristic (ROC) curve analysis

Based on the diagnosis made by MINI Plus and evaluation with the HADS, a ROC curve analysis was made to determine the optimal cutoff point of the scale. Figure 1 shows the resulting ROC curve. The HADS consists of 14 items, of which 7 make up a subscale of depression and 7 make up a subscale of anxiety. The areas under the curve (AUC) were respectively 0.928 and 0.979 for HADS Total and HADS Depression (HADS-D). There was no association between the anxiety subscale and the diagnosis of depression (p = 0.748). There was no correlation between the HADS-D and the HADS Anxiety (HADS-A) subscales (p = 0.438). The total score and the depression subscale were significantly associated with the diagnosis of depression (p < 0.001). The depression subscale exhibited the best performance. The cut-off values chosen based on ROC curve analysis were 10 for the total scale and 6 for the subscale of depression. These cutoffs have led to sensitivity of 83.3% and specificity of 83.3% for the total scale (accuracy: 0.83) and sensitivity of 100% with specificity of 99.17% for the subscale of depression (accuracy: 0.94).
Discussions

To our knowledge, this is the first study to evaluate the potential of HADS in the screening of PSD in Brazil. We found a prevalence of 26.7% of PSD in the acute phase, which is in agreement with the international literature and confirms the high frequency of mood disorders associated with stroke.

Carod-Artal et al. found that PSD was the strongest predictor of low health related quality of life in Brazilian stroke survivors. This fact points to the importance of detection and intervention in such cases. For this reason, we evaluated the use of HADS in screening for PSD. In a review of the literature, the threshold values identified for optimal balance between sensitivity and specificity for HADS showed little variability, and were close to 8, defined as the cut-off for ‘possible cases’ by the original authors of the scale. This threshold was found for HADS-A and HADS-D in the general population as well as in patients with medical conditions. However, studies evaluating its use in stroke patients suggested that the cutoff values could be lower for PSD detection. In this way, cut-points ranging from 4 through 8 for the HADS-D have been proposed in stroke.

In the present study, we found the value of 6 as optimal cutoff point for the depression subscale. This value led to a sensitivity of 90.0% and a specificity of 92.2% for the HADS-D. Sagen et al. also found cutoff values of 6/7 in 100 Chinese patients, though with sensitivity from 4 through 8 for the HADS-D have been proposed in stroke. Based on that, one could speculate whether the existence of a “vascular depression” would be linked to microangiopathy. In this context, we observed that HADS-D showed good performance in screening for depressive symptoms after acute stroke. Patients with PSD were more likely to present diabetes, and had greater disability and cognitive impairment in comparison to non-depressed patients. Future studies should focus on the longitudinal assessment of PSD patients to better define the contribution of each variable in the development of depressive symptoms after stroke, with the aim of designing effective interventions for treatment and rehabilitation.

Acknowledgements

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References