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RESEARCH ARTICLE

The Role of Short Term Psychological and Somatic Anxiety in the Prediction of Long Term Anxiety of Early Hospital Discharged Patients with Complete Functional Recovery after a Mild Stroke

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Few previous investigations have focused on post-stroke anxiety (PSA) predictors in mild stroke patients. The aim of the study was to determine whether anxiety-related psychological symptoms and psychomotor agitation predict PSA. We compared 10 anxious and 10 non-anxious patients at 6 months post-stroke (T2) to their psychological anxiety and psychomotor agitation levels 3 months earlier (T1). Anxious patients had more psychological anxiety symptoms than non-anxious patients. Overall T2 anxiety was strongly correlated with T1 psychological anxiety. Thus, psychological symptoms are a better predictor of PSA than somatic symptoms of anxiety. Those results could improve PSA diagnosis and prognosis by directing clinicians to pay particular attention to psychological anxiety after a stroke, even in early discharged patients with complete functional recovery.

Keywords: anxiety; predictors; screening; early recovery; early hospital discharge; mild stroke

Introduction

Anxiety symptoms affect nearly one quarter to one third of stroke patients and thus are one of the most frequent psychological manifestations to occur after the event (Barkercollo, 2007; Campbell Burton et al., 2013; De Wit et al., 2008). Previous research indicates that even though anxiety is related to the severity of disability in the aftermath of a stroke (Barkercollo, 2007), frequency of emotional disorders in mild stroke patients (survivors experiencing no or mild neurological disabling impairments) is as high as its prevalence in general stroke population (Altieri et al., 2012; Shi et al., 2015). However, few studies have specifically focused on anxiety after a stroke and much less is known in particular about post-stroke anxiety (PSA) in mild stroke patients experiencing early hospital discharge (Campbell Burton et al., 2011; Chun, Whiteley, Carson, Dennis, & Mead, 2015; Moran et al., 2014). Nonetheless, affective and mood impairments after a stroke have become an important theme of interest for research over the past years. Recent investigations of PSA's predictors (Ayerbe, Ayis, Crichton, Wolfe, & Rudd, 2014; Kootker et al., 2016; McGinnes, 2009) have found that among other socio-psychological variables such as age, gender, history of depression, stroke severity or inability to work, early anxiety levels after stroke were a strong predictor for further anxiety up to ten years.

The physical, somatic, vegetative and cognitive consequences of brain damage make emotional disorders diagnosis and prognosis difficult among stroke survivors (Carota & Bogousslavsky, 2012; McGinnes, 2009; Spalletta, Ripa, & Caltagirone, 2005). For example, it is hard to determine whether sudden and intense somatic activation (raising heart rate, body temperature and respiratory frequency) belongs to a vegetative dysregulation because of stroke or to a somatic manifestation of anxiety. On the other hand, having worries seems to be adapted in the context of stroke which possibly involves stressing consequences modifying the way of life of survivors (such as taking everyday medication, everyday transport due to driving license temporary suspension). It raises the question of the reliable indicators and predictors of PSA. Are there and what are the symptomatic specificities of anxiety in stroke survivors? Are somatic (psychomotor agitation, vegetative activation, muscular and physical tension) and psychological (worries and anxious thoughts, feelings and sensations of fear and

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panic) anxious-type manifestations equally reliable in the detection of anxiety in stroke patients? What symptoms should be focused on in order to detect anxiety in those patients?

To our knowledge, there are no studies focusing on these questions regarding PSA. Therefore, some studies investigating emotional disorders after stroke have recently focused on depression symptoms in the acute and sub-acute phases which predict later levels of depression. Results revealed that symptoms such as sadness, crying behaviors, negative thoughts and emotional reactivity in the acute phase predict levels of depression in the first months following a stroke, whereas symptoms such as fatigue, apathy and concentration difficulties do not (Carota et al., 2005; Lerdal & Gay, 2013; Sibon, Lassalle-Lagadec, Renou, & Swendsen, 2012). While anxiety and depression are psychological difficulties following a stroke that impact patients' well-being and quality of life (Ayerbe et al., 2014), similar research designs, applied to anxiety, could enhance our understanding of the specific acute symptoms that could predict sub-acute PSA. Such findings would be particularly important in improving the accuracy of anxiety's diagnosis and prognosis among stroke survivors, as well as in helping to better identify patients at higher risk of longer term anxiety on whom interventions should focus.

The aim of the present study was to explore how the somatic and psychological manifestations of anxiety are linked at three months and at six months after a stroke in patients with early functional recovery and early hospital discharge. Considering previously reported results about depression, we hypothesize that there are differences between anxious and non-anxious people regarding their levels of psychological symptoms of anxiety (worries and anxious thoughts, feelings and sensations of fear and panic) whereas we are not expecting differences between the two groups in regard of their somatic anxious-type manifestations (psychomotor agitation, muscular and physical tension). Thus, we think that post-stroke somatic perturbations are not reliable indicators to screen anxiety and to predict its evolution whereas psychological anxiety level is a better discriminant indicator.

Methods

Participants

At a university hospital stroke unit, patients were asked to participate in the study at 3 months post-stroke (T1). The inclusion criteria were: ischemic or hemorrhagic mild stroke diagnosed by a neurologist based on clinical and neuroimaging data, being over 18 years old, speaking and reading French and being discharged from the hospital within one month after the stroke. The study was conducted taking local ethical requirements into consideration and according to the ethical principles of the Helsinki Declaration. Enrolled patients were first informed on the procedure of the study and then gave their written informed consent.

Twenty individuals participated in the study: the mean age of the study sample was 64.5 years (SD = 16) and 45% (n = 9) were women. No patients suffered from any significant disability and all were able to carry out all usual activities. Eighteen individuals were diagnosed with stroke (17 ischemic and one hemorrhagic) and two with Transient Ischemic Accident. All enrolled patients received standard care and treatment. No one was given a specific treatment for anxiety.

Procedure and Materials

After inclusion, clinical interviews were administered by an experienced psychologist who assessed *DSM-IV-TR* (American Psychiatric Association, 2000) psychiatric disorders (Generalized Anxiety Disorder, Post-traumatic Stress Disorder, Major Depressive Episode, Dysthymic Disorder) with the *Mini International Neuropsychiatric Interview* (Sheehan et al., 1998) and anxiety symptoms severity with the *Covi Scale* (Lipman, Covi, & Downing, 1981). Then, patients filled out a paper version of the *Hospital Anxiety Depression Scale* (HADS) to self-report their anxiety level and symptoms (Zigmond & Snaith, 1983). The HADS is a reliable scale in stroke population with alphas reported at .91 for the whole scale and .89 for the anxiety subscale in previous validation study (Sagen et al., 2009). No difficulty was detected during the completion of the questionnaires since every participant suffered from a mild stroke with no disabling motor or cognitive impairment. The HADS was selected in reference to a recently validated factor analysis among psychiatric and somatic patients (Friedman, Samuelian, Lancrenon, Even, & Chiarelli, 2001; Lambert et al., 2013). This analysis identified two dimensions of anxiety assessed by the anxiety subscale of the HADS (HADS-A): psychological symptoms assessed by the *Psychic Anxiety* factor (items 3, 5, 9 and 13), and somatic and physiological symptoms assessed by the *Psychomotor Agitation* factor (items 1, 7 and 11). Classically, a HADS-A total score of 8 or more is used as a cut-off score in studies to distinguish cases and non-cases of anxiety. This cut-off point is also frequently used in stroke population and has a satisfying sensitivity and specificity (both up to .83) in screening anxiety disorders after stroke (Burton & Tyson, 2015; Menlove et al., 2015; Sagen et al., 2009).

At six months post-stroke (T2), patients were asked to fill in HADS again. The sample was divided into two groups based on HADS-A's threshold at T2, resulting in a group of ten "anxious patients" (HADS-A ≥ 8) and a group of 10 "non-anxious patients" (HADS-A < 8).

Data Analysis

Statistical analysis was performed with R i386 3.0.1. Non-parametric tests were used because of the small size of the study sample. The Wilcoxon-Mann-Whitney test was used to compare T2 anxious patients and T2 non-anxious patients regarding their psychological anxiety and psychomotor agitation levels at T1. Spearman correlation test was performed to observe the links between T2 anxiety and T1 psychological anxiety and psychomotor agitation. The degree of statistical significance was established at .05 for all tests.

Results

No significant difference was found when comparing T2 anxious and non-anxious patients on their levels of depression assessed by the HADS depression scale at T1 (U = 49, p = .970) and T2 (U = 45, p = .733). No significant differences were found between groups according to their gender (Fisher's exact test p = 1.00) and age (U = 72, p = .105).

At baseline, six patients presented with psychiatric disorders: two suffered from a Major Depressive Episode (MDE), two suffered from Generalized Anxiety Disorder (GAD), one suffered from an MDE comorbid with GAD, and one suffered from Dysthymic Disorder comorbid with GAD. One patient suffering from MDE at baseline belongs to the T2 non-anxious group; the five other patients presenting psychiatric disorders at baseline belong to the T2 anxious group.

Results of T1 hetero-assessed anxiety scores (Covi's scale assessed by an experimented clinician regarding its observation during the interview), results showed a trend for T2 anxious patients to have higher scores than T2 non-anxious patients (U = 25, p = .061). T2 anxious patients also had significantly higher scores of general anxiety measured with HADS-A (U = 21, p = .030) and psychological anxiety (U = 23, p = .043) at T1 than T2 non-anxious patients. No significant difference (U = 34, p = .217) was found on T1 psychomotor agitation (see **Table 1**).

Correlational results (see **Table 2**) showed that self-assessed (patients' self-reports) general anxiety levels at T2 had significant and highly positive associations with T1 hetero-assessed anxiety, self-assessed general anxiety, and psychological anxiety. No significant correlation was found between T2 HADS-A score and T1 psychomotor agitation.

Discussion

To our knowledge, this is the first study specifically focusing on symptoms specificity and perseverance of anxiety during the first months following a mild stroke. The purpose of the present study was to explore how the somatic and psychological anxious-type manifestations at three months after a stroke are linked with the presence of anxiety at six months post stroke in patients with early functional recovery and early hospital discharge. Our results in mild stroke patients are in line with previous investigations (Ayerbe et al., 2014; Sagen et al., 2009) that suggested early anxiety levels to be relevant predictors of later anxiety among general stroke population. Specifically, this study showed that anxious patients at six months after a stroke had higher levels of psychological anxiety symptoms at three months than non-anxious patients, whereas there was no difference for somatic anxiety symptoms. Thus, the present results go along with our hypothesis and suggest that psychological anxiety at three months is the only predictor of general anxiety at six months when considering a 2-factor structure of the HADS-A. Those results are in line with previous research about Post-Stroke Depression (Sibon et al., 2012) and are primarily documented here related to PSA. The main findings of the study propose that anxiety does not simply go

Table 1: T2 anxiety groups comparison of T1 anxiety levels and symptoms.

	Anxious at T2			Non-anxious at T2				
Measure	***M***	***SD***	**Range**	***M***	***SD***	**Range**	***U***	***p***
COVI T1	4.7	3.3	[1–11]	2.1	1.9	[0–6]	25	.061
HADS-A T1	8.9	3.2	[4–13]	5.7	2.9	[3–12]	21	.030
Psychomotor Agitation T1	4.1	1.5	[2–7]	3.2	1.5	[1–6]	34	.217
Psychological Anxiety T1	4.8	2.4	[1–9]	2.5	2.2	[0–7]	23	.043

Note. T1 = three months after stroke; T2 = six months after stroke; the Covi's anxiety scale (COVI); the Hospital Anxiety and Depression Scale-Anxiety subscore (HADS-A); anxious-type somatic symptoms (Psychomotor Agitation); anxious-type psychological symptoms (Psychic Anxiety).

Table 2: Correlations between T1 and T2 anxiety variables' scores.

Measure	**HADS-T2**	**COVI T1**	**HADS-A T1**	**Psychomotor Agitation T1**
COVI T1	.61 *			
HADS-A T1	.65 *	.67 *		
Psychomotor Agitation T1	.29	.38	.73 **	
Psychological Anxiety T1	.65 *	.67 *	.88 **	.35

Note. T1 = three months after stroke; T2 = six months after stroke; the Covi's anxiety scale (COVI); the Hospital Anxiety and Depression Scale-Anxiety subscore (HADS-A); anxious-type somatic symptoms (Psychomotor Agitation); anxious-type psychological symptoms (Psychic Anxiety); *p < .01; **p < .001.

away with time after stroke and that particular attention should be paid to psychological anxiety symptoms so that presence of anxiety could be identified and treated early.

Indeed, not only have we found that existing anxiety levels predict anxiety three months later where there is no intervention but we also found that participants suffering from other psychiatric disorders are more likely to have anxiety three months later. These findings are supportive of clinical recommendations for psychological intervention after a mild stroke.

These preliminary results may also improve our understanding of the mechanisms of post-stroke mental disorders. Because of the physical, somatic, vegetative and cognitive consequences of brain damage, affective disorders (anxiety and depression) diagnosis and prognosis is difficult in this population (Carota & Bogousslavsky, 2012; McGinnes, 2009; Spalletta et al., 2005). Specific symptoms should be identified in order to distinguish mood disorders from the consequences of stroke damage. The present results offer a perspective to answer this question since this is the first study focusing on symptoms specifically associated with PSA showing that only psychological anxiety symptoms in the earlier stages of stroke are reliable and specific indicators of anxiety and are also predictive of its later level.

Fifty percent of our sample reached cut-off scores for significant anxiety. These findings adhere to previous studies showing the high frequency of anxiety in general post-stroke population (Ayerbe et al., 2014). Even if the size of the sample may limit the extent to which our results can be generalized, this study suggests that patients who experience few or no incapacitating functional impairments can still suffer from significant anxiety. Thus, even if it appears essential for medical concern to be directed to the recovery of neurological and functional deficits in the acute phase of stroke, psychological dimensions of a stroke should also be considered in the general care of those patients and more attention should be given to their anxiety. Classical measures such the ones used in this study have already been proven to be reliable and sensitive in the detection of vulnerable patients for depression (Sagen et al., 2009) and presents results indicate that they could be as reliable and clinically useful for the detection of anxiety.

Some limitations have to be considered in the interpretations of the results of this study. Firstly, the anxiety subscale of the HADS only enables to assess two groups of anxious symptoms: the psychological ones and the somatic ones. However, the distinction between the different types of anxiety symptoms should be more specific and accurate than just somatic and psychological, and the predictive value of each anxiety symptom (for example worrying, anxious thoughts, motor agitation, muscular tension, attention deficit, irritability, sleep perturbation, etc.) should be studied by itself to better understand the specificity of PSA in mild stroke patients with early functional recovery.

Secondly, anxious and non-anxious participants have been categorized on the basis of their scores on a scale which is not originally designed for this purpose. Even though we referred to a cut-off score widely used in psychology research and with satisfying sensitivity and specificity in stroke population, we think that an assessment of anxiety disorders criteria according to the international mental disorders classifications would have been necessary to ensure the presence of anxiety disorders and also to specify the diagnosis (for example GAD, obsessive compulsive disorder, post-traumatic stress disorder).

Finally, even if our sample is composed of participants with no disabling impairments because of stroke, subtle perturbations could still impact the mood after a mild stroke. Indeed, given the fact that this is a preliminary study conducted on a small-sized sample, the present results could be affected by secondary influences and confounding variables. Thus, further studies in larger samples are needed so as to control confounding variables such as cognitive changes, functional limitations or social support for example (Barkercollo, 2007; Ayerbe et al., 2014).

Future research may confirm our findings not only in a larger sample but also at the earlier and at the longer term. There are indeed significant and interesting results in the present study concerning the evolution of anxiety between the third and the sixth month following a stroke, and it would be relevant to increase the time difference in order to determine if sub-acute psychological anxiety still predicts anxiety at the longer term. Future studies may also focus on specific anxiety symptoms in the acute phase of stroke. For example, it should be suggested to follow anxiety symptoms during hospitalization and the very first days following stroke in order to develop early detection, prevention and specific treatment of PSA.

Lastly, we think that future studies should rely on more ecological and momentary study design. Previous studies on post-stroke depression using daily Ecological Momentary Assessment of depressive symptoms (Jean, Swendsen, Sibon, Feher, & Husky, 2013; Sibon et al., 2012) have led to promising results for the comprehension of depression's characteristics and process in stroke survivors. Such designs have to be considered in future studies of anxiety in the acute phase of stroke. For example, it could be interesting to design a daily smartphone assessment of anxiety symptoms at home-return of early discharge patients to understand the factors associated with significant and impairing anxiety. Indeed, it would help to precisely identify the anxious manifestations occurring in the first stages after a stroke that lead to further impairments for stroke patients.

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Competing Interests

The authors have no competing interests to declare.

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