Characteristics of anxiety and psychological well-being in chronic post-stroke patients

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A R T I C L E   I N F O

Article history:
Received 27 September 2013
Received in revised form 3 December 2013
Accepted 3 January 2014
Available online 9 January 2014

Keywords:
Stroke
Anxiety
Depression
Quality of life
Well-being
Cognition

A B S T R A C T

Background and purpose: Anxiety and depression are common psychological conditions in post-stroke patients. In the present study, their relation with perceived quality of life and psychophysical well-being was investigated.

Methods: In the present cross-sectional study, chronic post-stroke patients (n = 81; average years from stroke = 4 ± 4.6) were assessed with the Hospital Anxiety and Depression Scale (HADS), the 36-item Short-Form Healthy Survey (SF-36) and the Psychological General Well-Being Index (PGWBI), as well as a brief neuropsychological assessment focused on the thinking ability and executive functions.

Results: Higher levels of anxiety compared to depressive symptoms were found. Hierarchical multiple regressions indicated that SF-36 predicts neither anxiety nor depression, and PGWBI subscales only partially.

Conclusion: Post-stroke anxiety can be a largely observed psychological distress in chronic patients: this pattern would be interpreted in relation to patients’ expectations about their health status during a rehabilitation follow-up. SF-36 and PGWBI questionnaires did not provide satisfactory and reliable indexes: the relation between anxiety and both quality of life and psychological well-being needs further exploration.

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1. Introduction

Anxiety and depression symptoms are commonly observed in stroke patients [1]. Studies on mood disorders after stroke have focused on post-stroke depression (PSD) [2,3] significant rates as a consequence of stroke have been observed both in acute phase [4] and 2 [5], 3 [6] or 5 years [7] after the vascular event. PSD incidence was estimated at between 10% and 50% for acute stroke patients [8] but decreased considerably during the chronic stage of the disease, suggesting that depressive symptoms are more frequent in the acute phase [9].

Knowledge about post-stroke anxiety (PSA) is in its early stages, but it is recognized as a common psychological condition after stroke [10,11]. Despite disagreement on the prevalence of anxiety in acute [12–14] and chronic stages [15,16] was reported in literature, PSA is a longer-term consequence of stroke compared to PSD [17]. PSA incidence reaches a rate of 20% after a month post-stroke, raising to 23% within 5 months an reaching 24% at 6 months or more after stroke [18]; according to these results, PSA incidence grows towards the chronic stage of stroke.

The aim of the present study was to review the long-term emotional outcomes, meaning the psychological profile observed more than 1 year after the vascular accident in chronic stroke survivors. Since depression and anxiety together reflect general psychological distress [19], we specifically focused on their possible relationship with perceived quality of life (QoL) and psychophysical well-being as post-stroke patients often have to reconsider their life in terms of personal goals, standards, and sociality in light of physical and/or cognitive deficits [20]. Although such relations have been widely investigated among patients in the acute phase [4,21], little is known about the subsequent effect of psychological distress and its reflections on the patient’s quality of life and functional outcomes [22]. Specifically, we focused on anxiety, which received less attention compared to other psychological dimensions in previous literature [4–7].

In the present study the general integrity of cognitive processes, specifically thinking ability and executive functions was outlined with a brief neuropsychological assessment, since the crucial role of the cognitive processes for the ability to judge one’s own health condition.

2. Subjects and methods

81 patients with first-ever or second clinical diagnosis of stroke participated in this study. They reached their 1st to 4th follow-up rehabilitative care hospitalizations; in fact, it was generally suggested that also
patients at more than 2 years from the event would benefit from rehabilitative treatment in order to maintain the level of improvement previously reached [23]. The present group was representative of a chronic post-stroke population, due to the time elapsed since the first cerebrovascular event. All the administered tests (both psychological and neuropsychological) were part of the diagnostic procedure adopted by the Clinical Psychology Unit of our Institution. Patients with global aphasia and those considered unable to cooperate due to behavioral disorders or already diagnosed dementia were previously excluded. RM data regarding lesion side were collected at the Division of Neurology, along with results at the FIM scale, which are referred to the more recent hospitalization.

2.1. Cognitive measures

Participants were assessed using the Mini Mental State Examination (MMSE) [24]. Several previous studies [5,6,25] restricted the cognitive profile to this test; however, this alone cannot yield a diagnosis for dementia and delirium among hospital patients [26]. Thus, we used the Clock Drawing Test [27], which both completes and improves the detection rate of dementia in primary care [28]. Moreover, the Frontal Assessment Battery [29], which investigates executive duties, and the Raven's Colored Progressive Matrices [30], which tests nonverbal and abstract reasoning ability [31], were administered.

2.2. Psychological assessment

Depression and anxiety were measured using the Italian version of the Hospital Anxiety and Depression Scale (HAD Scale) [32] which is a commonly used questionnaire assessing psychiatric morbidity [33] and mood disorders [34] in post-stroke patients by relying on the feelings from the previous week. It has 14 questions equally divided between anxiety and depression subscales. We set a threshold of 4 points for both scales [35–37] as an index for the possible presence of psychological distress.

Two further self-administered questionnaires were administered in their Italian versions. The 36-item Short-Form Healthy Survey (SF-36) [38], which investigates the perceived social and physical QoL domains: Physical functioning, Role limitation because of physical problems, Bodily pain, General health, Vitality, Social functioning, Role limitation because of emotional problems and Mental health. According to the SF-36 original procedure, each subscale’s raw score was subsequently turned into a 0–100 transformed score [39].

The Psychological General Well-Being Index (PGWBI) [40] focuses on the following mood states: Anxiety, Depression, Positive well-being, Self-control, General health and Vitality.

For both questionnaires, a high score in one or more scales suggests good health. Patients were asked to refer to the previous 4-weeks.

2.3. Analyses

Means and standard deviations (sd) for the neuropsychological and psychological scores were calculated. Independent-samples t-test for the factors Sex (males versus female) and Lesional area (right versus left hemispheres) and univariate analysis of variance for the factors Age (four clusters: <50 years; 50–59 years; 60–69 years; >70 years) and Education (four clusters: 0–5 years; 6–8 years; 9–13 years; ≥14 years) were carried out for all psychological subscales and the cognitive test score.

A Pearson product–moment correlation coefficient was applied in order to test the relationship between the score of the FIM scale [41] and the psychological subscales. Successively, a Pearson product–moment correlation coefficient was used in order to assess the relation between the value of HADS-A and the subscales of SF-36 and PGWBI. Variables associated with the HADS-A (p ≤ .05) were investigated further with hierarchical multiple regression to study the relative contribution of each significantly correlated psychological factor with the independent variable. The same procedure was also conducted for HADS-D.

3. Results

3.1. Demographic, psychological and neuropsychological results

Considering the average years from the vascular accident, participants would be representative of a chronic population (Table 1). As suggested by FIM score’s mean, the patients groups showed low level of physical and cognitive disabilities in their life; it’s necessary to emphasize that this scale scored patients relative to what they actually do on a day-to-day basis.

Most of the patients suffered from a right lesion: such data was clearly influenced by the exclusion of aphasics patients.

As shown in Table 2, the average scores’ means at neuropsychological testing in relation to the maximum score for each scale seemed to suggest the absence of dementia symptoms and, on the other hand, higher level of executive functions’ performance and abstract reasoning ability.

According to HADS results and considering a threshold of 4 as an index of possible pathological symptoms [35–37], the present group reported low levels of depression symptoms and high levels of anxiety symptoms. In fact, as reported in Table 3, average scores of 5.66 for anxiety (HADS-A) and 2.44 for depression (HADS-D) were found; prevalence rates were 55.6% and 19.7%, respectively. Thus, more than 1 out of 2 patients seems to suffer from anxiety.

By comparing means and standard deviations of SF-36 scores with the Italian reference values [38], we observe that Physical functioning and Role limitation because of physical problems are the only two subscales whose results are far from the average scores: thus they represented the two domains in which participants perceived a reduction of their well-being. The remaining subscales displayed a substantial overlap (see Fig. 1).

Relative to PGWBI means and standard deviations of reported scores showed an impressive overlap with the Italian norms on healthy population [41]. Such overlap is not only observed for all subscale, but also for

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Characteristics of post-stroke patients.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gender</td>
<td>M = 48 (59.2%) F = 33 (40.8%)</td>
</tr>
<tr>
<td>Age</td>
<td>m = 62; sd = 12.6; range = 26–87</td>
</tr>
<tr>
<td>Education</td>
<td>m = 9.4; sd = 3.9; range = 5–18</td>
</tr>
<tr>
<td>Time from stroke (years)</td>
<td>m = 4; sd = 4.6; range = 1–20</td>
</tr>
<tr>
<td>Number of stroke diagnosis</td>
<td>1st = 96.3%; 2nd = 3.7%</td>
</tr>
<tr>
<td>Lesion</td>
<td>Right = 64% Left = 36%</td>
</tr>
<tr>
<td>Type</td>
<td>Ischemic = 83.9% Hemorrhagic = 16.1%</td>
</tr>
<tr>
<td>Aetiology</td>
<td>Cortical = 51.8% Subcortical = 22.2%</td>
</tr>
<tr>
<td>Subcortical Mixed = 25.9%</td>
<td></td>
</tr>
<tr>
<td>Functional Independence Measure (FIM)</td>
<td>m = 92.3; sd = 20.8</td>
</tr>
</tbody>
</table>

About Gender: M = males; F = females. Age, Education and Time from stroke are reported in years. For side of lesion, cortical and subcortical lesions were included.

### Table 2

<table>
<thead>
<tr>
<th>Test</th>
<th>Max</th>
<th>Total score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mini Mental State Examination</td>
<td>30</td>
<td>26.7 (3.5)</td>
</tr>
<tr>
<td>Clock Drawing Test</td>
<td>10</td>
<td>8.3 (3.3)</td>
</tr>
<tr>
<td>Frontal Assessment Battery</td>
<td>18</td>
<td>15 (3.5)</td>
</tr>
<tr>
<td>Coloured Progressive Matrices</td>
<td>36</td>
<td>26.4 (5.4)</td>
</tr>
</tbody>
</table>

Values are given as mean and (sd). Max indicates maximum score for the scale.
the Total Scale, which suggested that the perceived well-being extended to all domains of psychological and physical health (see Fig. 2).

3.2. Association of the demographical variables and cognitive measures with psychological measures

Sex, Age, Education and Lesional Side did not significantly differ in relation to HADS-A and HADS-D \(p \geq .17\). Regarding SF-36, no significant differences for Sex, Education and Lesional Side emerged for the psychological subscales \(p \geq .35\). Age groups significantly differed on the Physical functioning score \(F(3,76) = 3.47; p = .02\); Bonferroni corrected estimated marginal means comparison indicated that people 50 years or younger had higher scores than those 60–69 years old \(p = .02\) while 70 years or older had a lower score than 50 years or younger \(p = .04\); no other significant difference emerged \(p \geq .14\). For PGWBI, no differences between Sex, Education and Lesional Side for the psychological subscale \(p > .18\) were found. Age groups significantly differed in relation to the Self-control score \(F(3,75) = 3.04; p = .03\); post-hoc comparisons indicated people 50 years or younger had higher scores than 70 years or older \(p < .02\); no other difference was significant \(p > .16\).

Among the cognitive measures, no significant differences emerged between Sex, Age and Lesional Side \(p > .23\). Education groups significantly differed on Coloured Progressive Matrices \(F(3, 31) = 3.59; p = .02\); people with 0–5 years of education had a lower score than those with \(\geq 14\) years \(p = .03\); no other differences were significant \(p > .17\).

There was a significant positive correlation between FIM score and Physical functioning \(r = .53; n = 63; p < .001\) and General Health

<table>
<thead>
<tr>
<th>Questionnaire</th>
<th>Range</th>
<th>Mean (sd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HADS-A (Anxiety)</td>
<td>0–21</td>
<td>5.66 (3.55)</td>
</tr>
<tr>
<td>HADS-D (Depression)</td>
<td>0–21</td>
<td>2.44 (3.55)</td>
</tr>
<tr>
<td>SF-36</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Physical functioning</td>
<td>0–100</td>
<td>38.58 (30.61)</td>
</tr>
<tr>
<td>Role limitations because of physical problems</td>
<td>0–100</td>
<td>14.20 (26.20)</td>
</tr>
<tr>
<td>Bodily pain</td>
<td>0–100</td>
<td>63.52 (26.11)</td>
</tr>
<tr>
<td>General health</td>
<td>0–100</td>
<td>58.64 (18.92)</td>
</tr>
<tr>
<td>Vitality</td>
<td>0–100</td>
<td>58.02 (19.23)</td>
</tr>
<tr>
<td>Social functioning</td>
<td>0–100</td>
<td>55.55 (21.74)</td>
</tr>
<tr>
<td>Role limitations because of emotional problems</td>
<td>0–100</td>
<td>60.49 (41.54)</td>
</tr>
<tr>
<td>General mental health</td>
<td>0–100</td>
<td>66.32 (16.94)</td>
</tr>
<tr>
<td>PGWBI</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Anxiety</td>
<td>0–25</td>
<td>18.45 (3.48)</td>
</tr>
<tr>
<td>Depression</td>
<td>0–15</td>
<td>12.44 (2.08)</td>
</tr>
<tr>
<td>Positive well-being</td>
<td>0–20</td>
<td>11.74 (3.75)</td>
</tr>
<tr>
<td>Self-control</td>
<td>0–15</td>
<td>13.45 (2.39)</td>
</tr>
<tr>
<td>General health</td>
<td>0–15</td>
<td>8.84 (3.15)</td>
</tr>
<tr>
<td>Vitality</td>
<td>0–20</td>
<td>13.96 (3.08)</td>
</tr>
<tr>
<td>Total scale</td>
<td>0–110</td>
<td>76.38 (20.46)</td>
</tr>
</tbody>
</table>

Values are given as mean and (sd). Range of score for each scale was reported.
[\textit{r} = .29; \textit{n} = 63; p < .01] scales of SF-36, suggesting that the global level of disability is related to the general condition of health and, specifically, to physical mobility in everyday life.

3.3. The predictive value of well-being index on Anxiety value. No significant correlation emerged between HADS-A and the psychological subscale of SF-36 (\textit{p} > .41).

For the PGWBI subscale, HADS-A was strongly significantly correlated with the subscales of \textit{Positive well-being} (\textit{r} = −.55; \textit{n} = 80; \textit{p} < .001), \textit{Vitality} (\textit{r} = −.54; \textit{n} = 80; \textit{p} < .001) and \textit{General health} (\textit{r} = −.53; \textit{n} = 80; \textit{p} < .001) and moderately significantly correlated with \textit{Anxiety} (\textit{r} = −.47; \textit{n} = 80; \textit{p} < .001), \textit{Depression} (\textit{r} = −.40; \textit{n} = 80; \textit{p} < .001), and \textit{Self-control} (\textit{r} = −.394; \textit{n} = 80; \textit{p} < .001). The hierarchical stepwise multiple regression was conducted with HADS-A and the following predictors: at the first step, \textit{Anxiety}; secondly \textit{General health}, \textit{Positive well-being}, \textit{Self-control}, \textit{Depression}, \textit{Vitality}. As suggested by the result reported in Table 4, \textit{Anxiety} and \textit{General health} were significantly negatively related to HADS-A, while \textit{Depression} was positively related to HADS-A. The other variables did not enter the model (\textit{p} > .09).

3.4. The predictive value of well-being index on Depression value

HADS-D was significantly correlated with the SF-36 subscale of \textit{General health} (\textit{r} = −.22; \textit{n} = 80; \textit{p} = .046) and \textit{Mental health} (\textit{r} = −.22; \textit{n} = 80; \textit{p} = .04). No other correlation reached significance (\textit{p} > .12).

A significant strong correlation appeared between HADS-D and the total score of PGWBI [\textit{r} = −.53; \textit{n} = 80; \textit{p} < .001]. Specifically, HADS-D was strongly correlated with the subscales of \textit{Positive well-being} [\textit{r} = −.62; \textit{n} = 80; \textit{p} < .001] and \textit{Vitality} [\textit{r} = −.56; \textit{n} = 80; \textit{p} < .001] and moderately significantly correlated with \textit{Depression} [\textit{r} = −.43; \textit{n} = 80; \textit{p} < .001], \textit{Self-control} [\textit{r} = −.42; \textit{n} = 80; \textit{p} < .001], and \textit{Anxiety} [\textit{r} = −.39; \textit{n} = 80; \textit{p} < .001] with a small significant correlation with \textit{General health} [\textit{r} = −.29; \textit{n} = 80; \textit{p} = .008].

The hierarchical stepwise multiple regression was conducted with HADS-D and the following predictors: at the first step, \textit{Depression}; secondly \textit{General health} and \textit{Mental health} (from SF-36) and \textit{General health}, \textit{Positive well-being}, \textit{Self control}, \textit{Vitality} (from PGWBI). As suggested by the result reported in Table 5, \textit{Depression}, \textit{Positive well-being} and \textit{Vitality} were negatively related to HADS-D. The other variables did not enter the model (\textit{p} > .058).

4. Discussion

The aim of the present work was to investigate the psychological outcomes in a cohort of chronic post-stroke patients, along with well-being and QoL. Compared to depressive symptoms, higher levels of anxiety were found even though previous studies on PSD revealed depression as the most pervasive psychological distress following a stroke [7,37].

In the present study, chronic stroke patients reported to suffer more anxiety symptoms, than depressive ones; conversely, the rates of depressive symptoms were lower than those reported in other studies [42–44], in which higher depression rates were observed among post-stroke populations.

### Table 4

Hierarchical stepwise multiple regression results relative to HADS-A and the significantly correlated psychological factors (\textit{n} = 81).

<table>
<thead>
<tr>
<th>HADS-A</th>
<th>R square</th>
<th>Predictors</th>
<th>B</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>First step</td>
<td>.42 [F (1, 79) = 22.2; p &lt; .001]</td>
<td>Anxiety</td>
<td>−.47</td>
<td>−4.71</td>
<td>&lt;.001</td>
</tr>
<tr>
<td>Second step</td>
<td>.42 [F (6, 79) = 8.98; p &lt; .001]</td>
<td>General Health</td>
<td>−.359</td>
<td>−2.85</td>
<td>.006</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Depression</td>
<td>.448</td>
<td>2.43</td>
<td>.017</td>
</tr>
</tbody>
</table>

We also found that PGWBI \textit{Depression} scale’s score increased with the HADS-A value, but decreased with HADS-D: this pattern of results appeared to be in line with the hypothesis that depression and anxiety may occur independently of each other [14]; anxiety could increase over time as a long-term consequence of stroke [17] as depressive symptoms are generally more frequent in the acute stage [9].

Most part of the participants at the present study were newly admitted to hospitalization several years after a stroke. They all lived in their homes and, according to results at FIM, they showed lower level of physical and cognitive disability. However the low levels at the SF-36 subscales \textit{Physical Functioning} and \textit{Role limitations because of physical functioning} would suggest that they experienced the physical consequences and limitations resulting from stroke in everyday life. Even though a cross-sectional study can’t allow to infer about previous or future behavioral changes, we hypothesize that the observed higher anxiety rate reflected patients’ expectations from the recent hospitalization for rehabilitation care; indeed, anxiety could arise from reliance on general health outcomes. It was reported in literature that PSD and emotional stress could negatively affect long-term functional recovery [6], and their neurological outcome [45]. However, also high anxiety rates among post-stroke patients could certainly influence issues regarding the clinical practice (e.g. physical and cognitive rehabilitation outcomes), by enhancing feelings such as fear, nervousness and muscle tension. Therefore, clinicians should take into account potential influence of these factors among neurological outcomes [9], and further research is needed to clarify the relation between PSA and long-term functional recovery.

To our knowledge, there are no past reports which analyzed both psychological outcomes and QoL at the same time for such patients. Comparing the obtained score with the Italian normative values [38], the patients appeared to suffer more physical limitations and the related role limitations (i.e. daily life activities) than lack of vitality, social functioning and role limitations due to emotional problems; they had a nearly preserved (or recovered) social activity and regained almost part of their relationship network (e.g. relatives, friends). Of course, this may have consistently influenced the low depression rates on the HAD Scale as post-stroke social isolation and living alone are the most consistent risk factors associated with PSD and poor health-related QoL [46,47]. At the same time, it would be interesting to investigate more deeply if a preserved social activity might have amplified anxiety symptoms, through a stronger need to fully regain the past role in one’s relationship network.

Further investigating the application of the two psychological questionnaires in the chronic post-stroke population, we observed that SF-36 outcomes showed that depressive – and not anxiety symptoms – are related with the perception of lower physical and psychological health. According to the National Stroke Association Guidelines, anxiety symptoms in stroke cover ongoing worry, fear, muscle tension, feeling panicky, rapid heartbeat, feeling sick to the stomach and others. Considering these criteria and referring to the SF-36 proposed items, the questionnaire subscales cannot exhaustively explain anxiety symptoms for chronic post-stroke patients. In fact, only two questions from a total of five included in the Mental Health subscale explored a general nervousness index (“During the past 4 weeks [question 9b] have you been a very nervous person?; [question 9d] have you felt calm and peaceful?”).
Rather, patients who reported a high presence of anxiety symptoms and a poor level of general health in PGWBI, also reported higher HAD-A scale score suggesting the strength of the latter index and its reliability. Higher levels of depression rates are related to lower subjective levels of Positivity and Vitality. This pattern of results appeared to be in line with our hypothesis that anxiety symptom pathogenesis would be closely associated with the patients' expectations about their health status, specifically during the first days of a follow-up hospitalization. Depicting this, one of the three questions in the PGWBI General Health subscale asks: “Have you been concerned, worried, or had any fears about your health?”. It is worth noting that the question doesn’t specifically focus on motor illnesses, but takes into account more general health status.

However, both SF-36 and PGWBI didn’t point out a clear framework of poor QoL. On the contrary, all the investigated subscales showed scores which are next to the Italian averages [38,40]; the only exception pertained to the global physical efficacy in everyday activities, and the implicated limitations in social contexts, which appeared to be rather impaired in comparison to healthy population. These patterns seemed to be dissimilar to HAD Scales: as a matter of fact, the recorded high anxiety levels could hardly fit with an acceptable QoL. Thus further studies about the applicability of SF-36 and PGWBI to post-stroke population are necessary: specifically, standardizing both questionnaires among post-stroke populations should be a primary need, in order to clarify these discrepancies.

Likewise, most of the past studies investigating anxiety and depression after stroke didn’t emphasize the influence of the medication used, and this could have been a limitation also in the present study. In fact, almost all of our patients used antidepressants, but the scheduled dose might considerably vary within the group; furthermore, due to the time passed since stroke, it can’t be assured that patients have continuously been treated with antidepressants, and this might be another confounding factor. Actually, it would be assumed that antidepressants could have consistently reduced depressive symptoms only in cases of major depression [48].

We would also point out the importance of evaluating the cognitive efficacy of the participants in this kind of study, and how this guarantees greater strength of the relation between the questionnaire answers and the effective psychological outcome of the patient. Cognition has a key role in both psychological outcome and well-being of brain-injured patients, not only in terms of the ability to judge their own health condition correctly – about which anosognosia [49] represents the most dramatic example – but also in relation to the reliability of self-administered questionnaires with verbal and cognitive deficits [50]. Memory, orientation, language and attention are the most likely impaired cognitive domains after a stroke [51] depending on stroke severity, age [52] and lesion location [53]. Few previous similar studies granted such importance to the patient’s cognitive status [54]; many limited the assessment to the MMSE only [55], which has been considered an adequate index of self-evaluation skills [10], even though no item of this screening tool could be recognized as suitable to evaluate this kind of ability. For these reasons, we assessed the participants with a short neuropsychological battery which indicated a cognitive profile of normative values. Moreover, we excluded aphasic patients, due to the inability to understand and fill in self-administered questionnaires. The absence of clear dementia symptoms and of language impairments may have indirectly decreased the depressive symptoms registered by the HAD Scale [32] because cognitive impairment and aphasia are often significantly associated with depression [56,57].

Finally, in the present study no relationship between the lesion localization and PSD or PSA emerged confirming that the risk of depression [48,58] and of anxiety [14] doesn’t seem to be related to the brain vascular damage. Nonetheless, the association between definite injured cerebral localization and mood disorders still needs to be clarified by the cortical/subcortical and the left/right dichotomy relative to the emotional behavior [59].

5. Conclusions

Anxiety was reported more frequently than depression symptoms for post-stroke patients in the chronic stage (more than 1 year after the event). SF-36 and PGWBI questionnaires seem not to provide satisfactory and reliable indexes about QoL and well-being in this population. Defining a neuropsychological profile of stroke patients is crucial in the psychological assessment, specifically when QoL and well-being are investigated via self-administered questionnaires.

Sources of funding

IRCCS Istituto Auxologico Italiano.

Disclosures

None.

Acknowledgments

The Authors would like to thank Laura Bertella, Francesca Ceriani, Alessandra Daniele and Riccardo Pignatti for providing neuropsychological data.

This work is in memory of Simonetta D’Alisa and Giacinta Miscio.

References


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