

The Relationship between Cognitive Impairments of Acute Stroke Patients and Their Caregivers' Mental Status in Zanjan Province

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ABSTRACT

Background: Stroke is one of the leading causes of death and long-term disabilities; it is also considered the second and third leading cause of cognitive impairment and death, after cardiovascular diseases and cancers, in industrialized countries. Since caregivers of stroke patients have a close relationship with them and bear a great burden of care, this study was conducted to determine the relationship between cognitive impairments of acute stroke patients and their caregivers' mental status in Zanjan Province.

Methods: This cross-sectional study was conducted on 140 stroke patients admitted to Valiasr Hospital of Zanjan Province and their caregivers. The Mini-Mental State Examination (MMSE) and the Wechsler Adult Intelligence Scale (WAIS) were used to assess the cognitive status of stroke patients, and the Depression, Anxiety and Stress Scale-21 Items (DASS-21) was employed to evaluate the mental health of their caregivers.

Results: The participants in this study included 140 stroke patients with a mean age of 62.15 ± 11.84 years, 62.8% of whom were male. The coefficient of correlation between the WAIS score of patients and the mean anxiety and stress scores of caregivers was -0.41 ($p=0.01$) and -0.36 ($p=0.02$), respectively. Moreover, the coefficient of correlation between the MMSE score of patients and the mean anxiety and stress scores of caregivers was -0.38 ($p=0.04$) and -0.31 ($p=0.03$), respectively. The results indicated that there was no significant relationship between the mean depression score of caregivers and the mean WAIS and MMSE scores of patients ($p < 0.05$).

Conclusions: The study findings showed that there was a significant relationship between the stress and anxiety levels of caregivers and the cognitive status of stroke patients. However, no significant relationship was found between the depression level of caregivers and the cognitive status of stroke patients. It is hence recommended to take into account the caregivers' mental health status in future diagnostic methods, treatment policies, and evaluation of care programs.

Keywords: Acute stroke, Caregiver, Depression, Stress, Anxiety, Cognition

INTRODUCTION

Stroke is the second leading cause of death and the third leading cause of disability worldwide [5]. Despite technological advances, stroke is still considered a big deal in different societies and accounts for more than half of the neurological patients admitted to medical centers [6]. As one of the main causes of disabilities, stroke is a condition that occurs suddenly and its longevity can challenge the life of survivors and their families. Stroke survivors usually experience complications such as brain injuries, physical or cognitive impairment, and speech impairment [7, 8].

Cognitive disorders are among the common complications of a stroke that lead to poor functioning of patients. Such disabling disorders necessitate the continuous cognitive follow-up and evaluation of stroke patients [9, 10]. Patients with acute stroke need to be admitted to a medical center. Since such patients may suffer from severe cognitive disorders during the first trimester after the onset of the injury, stroke patients should be under cognitive evaluation and monitoring in the early stages of the disease [11, 12].

The main pillar of long-term care programs is home caregivers who take care of the elderly and the disabled for free. In most cases, the

family members take direct responsibility for taking care of the patient [13]. Caregivers of stroke patients are at high risk and bear great pressure [14]. The findings of Pizantes (2016) showed that a family member usually carries the burden of caring for 95% of dependent or disabled individuals of a family [15]. It is of great importance to address the psychological problems and disorders of caregivers because they are very close to a patient or disabled person and have the most extensive permanent emotional, cognitive, verbal, and nonverbal relationships with them. Cognitive deficits in stroke patients can apply extra pressure on caregivers, influence their performance, and make them face some challenges. Therefore, it is recommended to take into account the caregivers' mental health status in future diagnostic methods, treatment policies, and evaluation of care programs. This study hence aims to determine the correlation between cognitive disabilities of patients with acute stroke and the mental status of their caregivers in Zanjan, Iran.

MATERIALS AND METHODS

This cross-sectional study was conducted on 140 stroke patients admitted to Valiasr Hospital of Zanjan and their caregivers from December 2019 to April 2020. Based on complete enumeration, all patients diagnosed with a stroke by a neurologist in the studied hospital were selected as the sample. The inclusion criteria were as follows: being over 18 years old, non-affliction with aphasia and impaired consciousness based on the patient's medical records, a consciousness score of 13-15 according to the Glasgow Coma Scale (GCC) (patients who are awake or at least in a phase of confusion), unilateral brain lesion (based on medical records), and being in the first month after a stroke. The only inclusion criterion for the caregivers was the ability to read and write. Both patients and caregivers the written consent form before entering the study. First of all, a therapist completed a form of general information, including age, gender, hemispheric dominance, the affected side of the brain, and the number of days elapsed from stroke, for patients and their caregivers. Then WAIS and MMSE were employed to measure the cognitive disability of patients. The WAIS consists of verbal and non-verbal scales: the verbal scale includes tests on general information, verbal comprehension, direct and inverse numerical memory, mathematical reasoning, similarities,

and complimentary words. The non-verbal scale involves incomplete images, visual perception, scientific reasoning, image-making, and accuracy, and association. The direct and reverse digit sequencing subscale was also used in this study. Saedet *et al.* (2009) validated this test and reported that the reliability coefficient of this subscale was greater than 0.8 and its split-half reliability coefficient was 0.85 [40, 41].

The 30-point MMSE was performed to screen the patients in terms of cognitive disorders. The MMSE is also used to estimate the severity of cognitive disorders in a specific period and to follow the rate of cognitive changes in a short period. Therefore, this test can effectively measure one's response to treatment [42, 43]. The MMSE subscales are orientation to time, orientation to place, registration, attention and focus, recall, language, and visual structure. The maximum score on this test is 30, and lower scores indicate the existence of cognitive deficits. This test was standardized in Iran by Foroughan *et al.* (2008).

The mental health status of caregivers was evaluated by the DASS-21. This scale consists of 21 items that measure stress (7 items), anxiety (7 items), and depression (7 items). The items are scored based on a 4-point Likert scale (0: Did not apply to me at all, 1: Applied to me to some degree, or some of the time, 2: Applied to me to a considerable degree or a good part of time, and 3: Applied to me very much or most of the time). Higher mean scores on each of these three variables indicate higher levels. The psychometric features of this scale have been investigated in several studies. Cronbach's alpha coefficient for depression, anxiety, and stress subscales in the Farsi version of DASS-21 was obtained 0.85, 0.75, and 0.87, respectively [49].

RESULTS

Of the 140 stroke patients who participated in this study, 88 patients (62.8%) were male and 52 (37.2%) of them were female. The mean age of participants was 61.81 ± 12.4 for men and 62.5 ± 11.12 for women (30 -72 years); there was no significant difference between male and female patients in this regard. The data showed that 128 patients (91.4%) were right-handed and 12 patients (8.6%) were left-handed. In addition, right-sided and left-sided motor deficits were observed in 54 patients (38.6%) and 86 patients (61.4%), respectively. The mean time elapsed from the stroke among the patients was 13.42 ± 9.12 days, ranging between 1 and 35 days. The

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mean WIAS and MMSE scores of stroke patients were 5.4 ± 2.9 and 18.54 ± 6.91 , respectively. Moreover, the mean stress, depression, and anxiety scores of caregivers were 9.02 ± 4.45 , 6.90 ± 4.55 , and 4.60 ± 4.20 , respectively. Table 1 shows the severity of depression, anxiety, and stress in the study participants. According to the results, 60.8% of caregivers suffer from some degree of depression (Mild, Moderate, Severe or very severe). Also, 66.4% of caregivers with mild to very severe anxiety and 75% of them have mild to very severe degrees of stress.

Table1. Depression, stress and anxiety status of the caregivers in Zanjan Province (n = 140).

	Depression	Anxiety	Stress
	Count (%)	Count (%)	Count (%)
Normal	55(39.2)	47(33.6)	35(25)
Mild	35 (25.1)	38 (27.2)	39 (27.8)
Moderate	29(20.7)	27(19.3)	30(21.4)
Severe	14(10)	19(13.5)	24(17.2)
Extremely severe	7(5)	9(6.4)	12(8.6)

Table2. Correlations between subscales of Mental Health with WAIS and MMSE scores in Zanjan Province (correlation coefficients). (n = 140)

Subscales of mental health of the caregivers	WAIS score	MMSE score
Stress	-0.36 (p=0.02)	-0.31 (p=0.03)
Anxiety	-0.41 (p=0.01)	-0.38 (p=0.04)
Depression	-0.11 (p=0.35)	-0.18 (p=0.63)

DISCUSSION

The study findings showed that there was a significant relationship between the stress and anxiety levels of caregivers and the cognitive status of stroke patients. However, the depression score of caregivers exhibited a significant relationship with none of the WIAS and MMSE scores of patients. Menonet *et al.* reported that caregivers of stroke patients are exposed to a variety of physical, psychological, social, and economic pressures [50]. Chen *et al.* (2017) also showed that mental, physical, and social challenges predispose caregivers of stroke patients to physical conditions, poor mental health (depression and post-traumatic stress), cognitive impairment, financial problems, social isolation, family role disorders, changes in life goals or plans, and decreased quality of life [51]. Balhara *et al.* (2012) also stated that caregivers of stroke patients experience psychological stress, depression, and a variety of family, financial, individual, and social problems. They also found that the great pressures imposed on caregivers of stroke patients can increase their anxiety and depression levels [52]. Some caregivers of stroke patients may overestimate their stress

level. Table 2 presents the correlation coefficients and significance levels between the mental health subscales (stress, depression, and anxiety) and the mean WIAS and MMSE scores. The highest correlation coefficient was observed between the mean WIAS and MMSE scores of stroke patients and their caregivers' anxiety level. However, there was no significant relationship between the depression score of caregivers and the mean WIAS and MMSE scores of patients ($p < 0.05$).

level. Studies have shown that the high severity of depression can lead to a decrease in the mean score of physical and psychological dimensions of quality of life among caregivers of stroke patients. Additionally, anxiety can adversely affect the psychological dimension of quality of life in this group of caregivers [53, 54]. They are also more likely to suffer from sleep disorders and physical and psychological stress and face more problems with the personal, intestinal, and bladder health needs of the patient. On the other hand, the passage of time can affect the caregiver's perception of the disease as well as their depression and anxiety levels. Researchers argue that caregivers may gradually experience fewer sleep disorders and physical problems as more time elapses from the onset of the disease. As mentioned earlier, since one of the main problems of caregivers of stroke patients is mental conditions, it is very necessary to pay special attention to the mental health status of such caregivers [51-53].

This study showed that the lower the cognitive level of patients with acute stroke, the higher the anxiety and stress levels of their caregivers. Rohde *et al.* investigated the relationship between the reduced cognitive level in stroke

patients and the mental health of their caregivers 5 years after the stroke. They followed up 87 stroke patients and their caregiver for 5 years and finally reported that one-fifth of caregivers exhibited signs of anxiety and stress and one-fourth of them had depression symptoms. They concluded that the reduced cognitive level of stroke patients was effective in the appearance of depression, stress, and anxiety symptoms [25]. However, the present study showed that there was no significant relationship between the cognitive status of stroke patients and the depression level in their caregivers. This discrepancy can be attributed to the conditions of participants; Rohde *et al.* studied the patients with chronic stroke, whereas the present study was conducted on patients with acute stroke. Since patients with acute stroke are usually admitted to medical centers, their caregivers are more exposed to higher levels of anxiety and stress, which are known as acute psychological symptoms. However, due to the short duration of this unpliant event, no association was found between depression symptoms of caregivers and the cognitive status of patients. Therefore, there is a need for longitudinal and prospective studies to investigate this component of mental health and its relationship with the cognitive status of stroke patients.

Emet *et al.* (2017) conducted a study on 76 stroke patients and 94 healthy individuals (as the control) and showed that caregivers of stroke patients were emotionally in an unfavorable state and their mental health was associated with the severity of patients' functional disability [21]. They measured the overall function of stroke patients by the Barthel Index, whereas this study investigated the cognitive function of stroke patients. Caro *et al.* also showed that there was no significant relationship between the cognitive status of patients and the quality of life and care burden of their caregivers [22]. Nevertheless, since their study was conducted on a small sample (30 patients and their caregivers), this hypothesis needs to be tested in more extensive studies on larger samples.

In general, families of stroke patients usually face levels of psychological stress resulting from physical, mental, and social malfunctioning. Caregivers of neurological patients experience a variety of stresses because of the disabilities of such patients, the long duration of treatment, complications caused by disabilities, and the need for extensive and long-term care [23]. Cognitive deficits in stroke

patients can apply extra pressure on caregivers, influence their performance, and make them face some challenges. Therefore, it is recommended to take into account the caregivers' mental health status in future diagnostic methods, treatment policies, and evaluation of care programs.

AUTHORS' CONTRIBUTIONS

All authors contributed to the conception and design of the study, the acquisition of data and to the analysis and interpretation of data. SF drafted the manuscript. All authors were involved in critically revising the article for important intellectual content and gave final approval of the version to be published. All authors read and approved the final manuscript.

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