



Research paper

Neuropsychological rehabilitation of patients with symptoms of depression after ischemic stroke

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ABSTRACT

Introduction: Depression significantly affects the effects of rehabilitation, quality of life, as well as patients' mortality. The estimated prevalence of post-stroke depression is approximately 25%–70%.

Aim: To examine when neuropsychological rehabilitation after stroke affects the cognitive functions of people suffering from depression.

Material and methods: 42 persons after ischemic stroke suffering from depression took part in the study. The participants were in 3 weeks daily neurological rehabilitation care. Mood disorders were measured by Beck depression inventory. Cognitive functions were examined using verbal fluency test and following psychological tests: mini mental state examination, color trail test and Benton visual retention test.

Results and discussion: Mood disorders were diagnosed in 70% of patients. The neuropsychological diagnosis revealed existing memory disorders, low resistance to distractors (30.9% participants), impaired visuospatial function (78.7%), impaired ability to recognize visual stimuli with preserved normal vision, weakened executive functions, in particular planning, initiating and sustaining activities (85.6%), rigid thinking, slackening, difficulty with focusing on the task, problems with selective attention and increased levels of anxiety. Verbal fluency deficits was diagnosed in 92.9% of patients. Significant improvements were observed for all cognitive domains after neuropsychological rehabilitation. The biggest improvement was noted in the attentional domain (73.8%), the least – in the visuo-spatial functions (21.4%).

Conclusions: Depression is a frequent and important problem among patients with stroke, as a post-stroke depression is present in at least 30% of survivors from stroke. Psychological complications such as emotional, behavioral and cognitive disorders, can have a negative effects on the social functioning and the overall quality of life of stroke survivors.

1. INTRODUCTION

Depression significantly affects the effects of rehabilitation, quality of life, as well as patients' mortality.¹ Its prevalence after stroke is significantly higher than in the general population and depends on the period that has elapsed since the onset of the disease. The level of post-stroke depression is estimated at 25%–70%: in studies carried out in hospitals 19%–47%, in rehabilitation centers 23%–47%, in four environmental studies 32%.^{2–6} This condition may be the result of fatigue, understood as a sense of rapid depletion of energy resources as a result of undertaken physical or mental activities.⁷ Post-stroke depression may occur in any period after the vascular incident, and mood disorders are present in patients even after 3–7 years.^{8–10} In some reports, a young age at the time of the disease is indicated as a risk factor for depression.¹¹

Somatic disease is a difficult situation in the life of every human being.¹² It can cause various ailments of the mental sphere, such as: anxiety, sleep disorders, depression, a reduced sense of security, also can lead to psychoorganic effects.¹³ As a consequence, the brain function is compromised, which is further affected by a mental disorder. In patients with symptoms of depression, the possibility of cognitive disorders is significantly higher than in patients without mood disorders.

2. AIM

The aim of this study was to examine when neuropsychological rehabilitation after stroke affects cognitive functions in people suffering from depression. We presented the results of neuropsychiatric tests and the effects of therapies carried out in the Clinical University Hospital in Olsztyn, in which patients with depression following ischemic stroke took part.

3. MATERIAL AND METHODS

In the study participated 42 people: 21 women and 21 men. The average age of women was 64.6 years (SD 10.3), men 65.1 years (SD 10.2). Patients with hypertension (67%), atrial fibrillation (19%), chronic heart failure (10%), atherosclerosis and endocrine diseases (24%) were the most numerous group. Diabetes occurred in 24% of people, hypercholesterolemia in 14% of people. In 12% of patients aphasia was found, and in 5% – dysarthria.

The participants were in 3 weeks daily neurological rehabilitation care. The condition of mood and cognitive functions in the patients before the therapy was started and after its completion (test-retest) was assessed. The performed tests are the standardized neuropsychological tests used to recognize the disorders in the post-stroke patients. All patients showed significant cognitive deficits in at least one domain evaluated with the use of psychological tests.

Mood disorders were measured by Beck depression inventory (BDI). The BDI is a 21-item, self-report rating inventory that measures characteristic attitudes and symptoms of depression.

Cognitive functions were examined using verbal fluency test and following psychological tests:

- mini mental state examination (MMSE) as a clinical scale to assess disorders in the cognitive functioning of patients and to monitor the course of the rehabilitation;
- color trail test (CTT) to diagnose the attention and executive functions;
- Benton visual retention test (BVRT) to assess visual-spatial functions and visual perception;
- verbal fluency test (VFT) to assess speech disorders.

Bioethics Committee of the University of Warmia and Mazury approved the study protocol (Resolution No. 22/2014; 25 June 2014). All participants expressed their written consent to participate in the study.

Comparisons of the mean values was performed with the non-parametric Wilcoxon test, at $P < 0.05$. All the analyses were performed with the IBM SPSS Statistics v. 23 software.

4. RESULTS

Disturbances of the visuo-spatial functions in BVRT were discovered in 79% of the respondents: 5% were light disorders, 31% were moderately disturbed and 43% were severely impaired.

Memory impairment measured using MMSE was recognized in 30.9% of subjects: in 7.1% – light disorders, in 11.9% – moderate disturbances, in 11.9% – significantly worse.

Attention and executive functions were diagnosed using the CTT. Disorders were found in 85.6% of subjects: in 9.5% – light disorders, in 19.0% – moderate disturbances, and 57.1% – in severe intensity.

VFT were found in 92.9% of patients.

The basic symptoms of depression in the examined group of patients on the day of admission to the Centre for Outpatient Rehabilitation of the Clinical University Hospital in Olsztyn were:

- (1) lowering the mood (49.9% of women and 57.1% of men) characterized by sadness, depression, lack of joy, happiness, satisfaction;
- (2) lowering the rate of psychomotor processes (inhibition) – manifestation was slowing the pace of thinking, problems with memory, a feeling of reduced intellectual performance (81.0% of women and 52.4% of men);
- (3) loss of appetite (33.3% of women and 23.8% of men) and unintentional weight loss (19.1% of women and 23.8% of men);
- (4) disturbances in the biological rhythms of sleep and wakefulness (71.4% of women and 57.1% of men), which were manifested in the shortening of night sleep, lack of deep sleep, waking up at night, or an increased need for night sleep and daytime sleepiness; there were also fluctuations in well-being during the day – in the early

hours it was the most significant, however with the passing of the day the mood was clearly improved;

- (5) almost persistent anxiety, manifesting in the form of irritability (47.6% of women and 33.3% of men), impatience, anger and even panic;
- (6) withdrawal from social life (52.4% of women and 52.4% of men), guiltiness, letting down other people (19.1% of women and 9.5% of men), fear of punishment (23.8% of women and 9.5% of men), lack of self-acceptance (38.1% of women and 14.3% of men).

The factor hindering the rehabilitation of disturbed functions was the pessimism concerning the future (23.8% of women and 42.8% of men) and the desire for death (19.1% of women and 28.6% of men).

The results of psychological assessment of patients' mood were consulted with the attending physician. In case of intense suicidal thoughts, the patients were consulted by a psychiatrist.

All patients were rehabilitated using kinesitherapy, pharmacological treatment and a proper diet was included. They also participated in neuropsychological therapy. It was carried out using the computer program Afa-System, 5 days a week for 0.5 hour.

In terms of mental functioning, after comprehensive therapy results were:

- in 21.4% of patients – improvement of visuo-spatial functions;
- in 50.0% – improvement of verbal fluency;
- in 73.8% – improved attentiveness and executive functions;
- in 38.1% – improvement of short-term memory.

After the completion of hospitalization the symptoms of depression were reassessed in patients (test BDI):

- (1) decreased well-being was found in 38.1% of women and 23.8% of men;
- (2) inhibition of the rate of psychomotor processes – 47.6% of women and 33.3% of men;
- (3) lack of appetite – 23.8% of women and 9.5% of men;
- (4) insomnia – 38.1% females and 38,1% males;
- (5) symptoms of anxiety – 28.6% of women and 14.3% of men;
- (6) withdrawal from social life (23.8% of women and 33.3% of men), guiltiness, fear of letting down other people (14.3% of women and 9.5% of men), fear of punishment (14.3% of women and 4.8 % of men), lack of self-acceptance (33.3% women and 14.3% men).
- (7) negative perception of the future (23.8% of women and 23.8% of men), desire to die (4.8% of women and 4.8% of men) (Figures 1 and 2).

5. DISCUSSION

In the ICD-10 classification, post-stroke depression (F06.32) is defined as a depressive episode that occurred in a causal and temporal relationship with hemorrhagic or ischemic stroke. The clinical picture of post-stroke depression corresponds to an episode of endogenous depression or dysthymia. However

in patients after vascular incident, psychomotor slowing, insomnia, appetite disorders and severe cognitive dysfunctions are more frequent. Compared to patients with endogenous depression, stroke patients have smaller intensification of symptoms such as decreased well-being, anhedonia and suicidal thoughts.^{14,15} The severity of symptoms in post-stroke depression is usually mild to moderate.

Among the causes of depression there are genetic determinants, environmental factors, somatic factors (hormonal disorders, infections, cranio-cerebral injuries, drugs, e.g. reserpine, hormonal preparations containing adrenal steroids, oral contraceptives). Mental factors include mainly emotional losses and dilemmas (death of a loved one, divorce), relocation, financial problems, and sometimes success.

Within the causes behind the brain damage, cardiovascular diseases play a significant role including: ischemic heart disease, atherosclerosis, arterial hypertension. All of them pose a risk of ischemia and hypoxia of the brain, and thus the occurrence of disorders of mental functions. And so, for example, due to myocardial infarction, nervous tissue gets damaged and that leads to memory disorders, executive dysfunctions, changes in psychomotor functioning, decreased criticism, and even focal deficits, i.e. impairment of specific movements (apraxia), loss of ability to read (alexia), writing and spelling (agraphy). Disorders of brain functions are also observed in diseases of the respiratory system, where mental dysfunctions result from brain hypoxia. As a consequence of respiratory diseases, attention disorders, slower pace of thinking, memory disorders, emotional problems, anxiety disorders and phobias occur.¹³

In case of ischemic stroke in the left lenticulocapsular area it is very important to thoroughly assess the patient in terms of depressive symptoms, as an early detection and instant treatment can significantly influence the outcome.^{16,17}

Emotional disorders can be not only the effect of damage to the brain structures, but also the result from a psychological reaction to loss of health as a result of the disease.¹⁸ Each person is unique, has different life experiences, pursues other activities – these are factors that protect or weaken the brain. Symptoms manifested by the patient result from the interaction between pre-sickness cognitive and personality functioning and neuropsychological changes directly related to brain damage.¹⁹

In the elderly, the age of more than 65 years, the clinical picture of depression is qualitatively different from that of younger people. Among the specific symptoms are: tears, excitability, anxiety, including concern about health, unjustified guilt, thoughts and intentions of resignation and delusions. Patients often complain only about the somatic function impairment and memory impairment, which makes the core symptoms of depression difficult to see.²⁰

Working with people after a stroke is a source of strong emotions for both the patient's family and members of the rehabilitation team. In accordance to the principles of neuropsychological rehabilitation presented by Prigatano, work with a patient requires learning about his subjective, phenomenological experience. The aim is to facilitate the patient's involvement in the therapy.¹⁹

In our own studies, post-stroke mood disorders were present in 46.3% of patients and occurred more frequently in women than men. Women more often complained about sleep disorders and fatigue. Drug depression treated pharmacologically occurred in 18.8% of patients. Researchers introduced similar research results. The authors found more frequent sleep disturbances in women than men. Women also more often were taking sleeping pills. It is suggested that the basis of the occurrence of affective disorders may be somatic diseases, which are much more common in people aged over 65 than in younger people.²¹

The dynamics and development of cognitive dysfunctions result from many factors, such as the location and extent of damage, the possibilities of brain plasticity, sex and age of the patient. Almost 50% of the patients affected by the acute stroke evinced the depression, however the depressive symptoms are not related to the location or type of the stroke, but to the previous mood disorders. Preponderant clinical feature is apathy.²² The approach of doctors and therapists in working with a patient after stroke should be individualized, depending on the psychophysical abilities of the patient, coexisting diseases, including the severity of the symptoms of depression, as well as the state before the disease.²³

6. CONCLUSIONS

Depression is a frequent and important problem among patients with stroke, as a post-stroke depression is present in at least 30% of survivors from stroke. Psychological complications such as emotional, behavioral and cognitive disorders, can have a negative effects on the social functioning and the overall quality of life of stroke survivors.

Conflict of interest

None.

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