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Affective and cognitive disorders in the late recovery period of ischaemic stroke

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Abstract. The purpose of this study was to identify neuropsychological features and the degree of functional autonomy in patients with ischaemic stroke in the late recovery period. The methodology was based on a cohort comparative study of 142 patients aged 50-80 years, conducted with the participation of the Kyrgyz State Medical Institute of Postgraduate Education and the Amanat University Clinic as a clinical base using scales to assess cognitive function, depression, anxiety, and functional autonomy questionnaire. The principal findings of the study demonstrated a high prevalence of neuropsychological disorders in patients in the late recovery period of ischaemic stroke. Cognitive deficits persisted in 82.7% of the patients, with an average score of 21.1 points on the cognitive function assessment scale. Short-term memory (68.4%), attention (60.2%), and orientation (46.9%) impairments were the most pronounced. Affective disorders were found in 72.4% of the participants, with major depression in 9.2% and severe depression in 28.5%; the mean depression scale score was 19.6 points. The level of anxiety exceeded the clinical threshold in 63.2% of patients, with a mean score on the Hamilton anxiety scale of 21.3. The mean score of functional autonomy in the experimental group was 13.8 points, and in patients with severe depression it decreased to 10.3. Women showed more pronounced affective symptoms and a lower level of autonomy than men. In the age subgroup over 70 years of age, a trend towards more pronounced cognitive decline and increased affective impairment was observed compared to other age categories. Cognitive-affective disorders detected in most patients had systemic impact on everyday autonomy and require complex correction already in the posthospital period. The findings are of practical value for neurologists, psychiatrists, and rehabilitation specialists, as they can be used in the development of individualised programmes of neuropsychological support for patients in the late post-stroke period

Keywords: neuropsychological disorders; functional autonomy; depression; cognitive function; anxiety; memory; attention

Introduction

The late recovery period of ischaemic stroke is characterised by persistent changes in the cognitive and affective spheres, which significantly affect the clinical course and rehabilitation potential. At this stage, patients often experience trouble with attention retention, information processing, behavioural regulation and emotional response. These impairments contribute to reduced daily activities, impaired interpersonal relationships, and hinder return to previous levels of social adaptation. The combination of cognitive deficits with anxiety or depressive symptoms forms a specific neuropsychological profile that requires a comprehensive approach to assessment. In late rehabilitation, it is these disorders that become a determining factor in the effectiveness of rehabilitation measures and long-term prognosis. Their study allows stratifying the patients more accurately according to the risk of functional limitations and to develop individualised therapy strategies.

A territorial approach to the study of cognitive and affective disorders after stroke allows tracing marked

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differences in access to diagnostics, the level of clinical attention, and the degree of implementation of neuropsychological support in the recovery period. In the Kyrgyz Republic, M.B. Yrysova *et al.* [1] analysed the dynamics of stroke morbidity and mortality, recording a steady increase in the epidemiological burden. Therewith, the researchers noted that despite the high prevalence of vascular pathologies, there is still no systematic assessment of the cognitive and emotional state of patients at the level of clinical practice. In the context of African countries, R.O. Akinyemi *et al.* [2] emphasised the fragmentation of approaches to the management of post-stroke conditions, where cognitive and psycho-emotional aspects are often neglected against the background of limited resources. The researchers emphasised the significance of creating sustainable regional strategies focused on integrating neuropsychological care into primary care. European cohort study by A.M. Lopatkiewicz *et al.* [3] demonstrated a statistically significant association between the level of depressive symptomatology in the post-stroke period and deterioration in functional status. This emphasises the clinical value of prompt detection of affective disorders for secondary prevention of disability. In the recommendations of the American Heart Association, N. El Husseini *et al.* [4] emphasised the need for universal cognitive screening in all patients after stroke, regardless of the clinical severity and form of the stroke event. The study positioned cognitive impairment as an independent prognostic factor requiring formalised observation and dynamic monitoring in the late recovery period.

Studies demonstrate a consistent association between the quality of rehabilitation and the severity of post-stroke cognitive and affective impairment. O.O. Pushko [5] provided evidence that systematic use of active motor and cognitive therapy considerably accelerates the recovery of neuropsychological functions. Particular attention is paid to a multilevel approach, including not only physical but also behavioural components. Evidence for the effectiveness of complex correction was also presented by V.K. Mishchenko & V.M. Mishchenko [6], who emphasised that the combination of physical exercise with psychotherapeutic modules leads to statistically significant reductions in anxiety and improvements in short-term memory. In contrast to these localised observations, an international cohort study led by L. Gallucci *et al.* [7] revealed a paradox: even with a prominent level of specialised care, cognitive dysfunction continues to be persistent and largely irreversible. The researchers concluded that current protocols lack duration and neuropsychological flexibility. In an extensive review, Y.Y. Huang *et al.* [8] presented key epidemiological patterns of post-stroke cognitive deficits, including differentiation by age and localisation characteristics. The study emphasised the need to implement cognitive screening as a routine clinical procedure at all stages of patient management.

One of the most challenging aspects of recovery after ischaemic stroke is persistent cognitive impairment, substantially affecting the daily autonomy of patients. D.D. Turgumbaev *et al.* [9] focused on the fact that the existing system of recording and monitoring does not include neuropsychological testing, which complicates planning targeted rehabilitation programmes. These data were confirmed in a population-based analysis by M. Obaid *et al.* [10], according to which a marked decline in cognitive function persists in patients' years after stroke, even if the neurological status is stabilised. The researchers noted that cognitive deficit is directly associated with increased disability and reduced quality of life, especially among elderly patients. A. Kusec *et al.* [11] revealed that anxiety-depressive manifestations and attention disorders tend to persist for a long time, which requires an interdisciplinary approach in rehabilitation. Therewith, some patients had cognitive deterioration even two years after stroke, regardless of the severity of the primary lesion.

The features of cognitive and affective disorders in the late recovery period of ischaemic stroke are still understudied, especially considering their interaction and influence on functional recovery. The purpose of the present study was to conduct a comprehensive assessment of cognitive and emotional disorders in patients at the late stage of post-stroke rehabilitation. The objectives of the study included determination of the structure and severity of cognitive deficit; identification of the degree of anxiety and depressive symptoms; establishment of interrelationships between cognitive and affective indices.

Materials and Methods

The clinical stage was conducted at the Faculty of Postgraduate Education and Science of the Kyrgyz State Medical Institute of Retraining and Professional Development named after S.B. Daniyarov (Bishkek), with the involvement of the Amanat University Clinic as the main outpatient and diagnostic base. This institution, functioning as a clinical base of the Institute, provided access to neuroimaging diagnostics, specialised medical consultations and comprehensive support of patients in the late recovery period of ischaemic stroke. The observation period covered six months, from June to December 2024. This time interval was chosen because of the need to include a sufficient number of patients who had completed the acute phase of treatment, as well as to enable a consistent cohort assessment of cognitive and affective state, considering the dynamics of post-stroke recovery.

The study included 142 patients aged 50 to 80 years (mean age 64.3 ± 7.1 years) because this is the interval in which ischaemic stroke cases with an elevated risk of remote cognitive and affective disorders are most frequently recorded; all participants had a history of stroke, and the mean post-stroke interval at the time

of inclusion in the study was 9.4 ± 2.7 months, which met the criteria for late recovery and helped to exclude the influence of the acute neuroinflammatory response on cognitive parameters. The total sample was divided into two groups. The experimental group (n = 98) included patients with clinically significant cognitive and/or affective disorders confirmed by neuropsychological screening. The control group (n = 44) included patients with no complaints and no pathological changes according to the test results. Intragroup distribution was performed by sex (women – 59.2%, men – 40.8%) and age subgroups (50-59, 60-69, ≥70 years), which provided the possibility of stratified analysis.

Inclusion criteria were as follows: confirmed diagnosis of ischaemic stroke (according to magnetic resonance imaging and hospital discharge), completed acute stage of treatment, cognitive and physical ability to undergo neuropsychological examination, and written informed consent. Patients with pre-stroke dementia, severe aphasia, psychotic disorders, and decompensated somatic diseases preventing participation in the study were excluded. This sampling model enabled a comparative assessment of the severity of cognitive and affective disorders in individuals in the late recovery period after stroke, considering age and gender differences.

Cognitive status was assessed using the Montreal Cognitive Assessment (MoCA) scale [12], which covers key cognitive domains and allows differentiating degrees of functional decline from mild to severe. The test was administered in person, by a specialist, lasted 10û15 minutes, and included tasks on memory, attention, orientation, abstract reasoning, and language skills. The maximum score was 30; values below 26 indicated cognitive deficits and below 18 indicated severe cognitive deficits. The Beck Depression Inventory-II (BDI-II) scale [13] was used to diagnose depression; it includes 21 items with a four-point gradation of symptom severity. Respondents filled out the questionnaire independently or with the help of an interviewer. The results were interpreted according to established thresholds: from minimal to severe depression (29-63 points). The Hamilton Anxiety Scale (HAM-A) [14] was used to identify anxiety disorders. It included 14 items and was assessed by a clinical-behavioural interviewer. A total score of up to 13 indicated no clinically significant anxiety; 14-17 indicated moderate and above 18 indicated severe anxiety. Functional autonomy was assessed using a 10-item adapted questionnaire capturing the ability to self-care in activities of daily living. Each item was graded from complete dependence (0) to complete autonomy (2), with a possible maximum of 20 points. Examples of wording included: "Can you eat and use cutlery independently?", "Do you need help taking prescribed medication?", "Are you able to organise your own personal hygiene, including washing and brushing your teeth?", "Can you move around the house and go outdoors without assistance?", "Do you need support with cooking and housekeeping?". Scores below 13 were interpreted as a pronounced decrease in autonomy.

The collected data were analysed using the IBM SPSS Statistics package (version 27.0). Student's t-test, Pearson's χ^2-test and one-factor analysis of variance Analysis of Variance were used to assess differences between groups, depending on the nature of the data. Correlation analysis was performed using Pearson's coefficient. In all cases, $p < 0.05$ was considered the critical level of significance, with $p < 0.01$ and $p < 0.001$ being additionally recorded as high and very high statistical significance levels, respectively, if there were more pronounced differences.

Ethical aspects of the study were ensured according to the American Sociological Association Code of Ethics [15], which stipulates mandatory informed consent, voluntary participation, and data confidentiality. All participants pre-signed a consent form explaining the aims, methods, and potential risks of the study. Additionally, the provisions of the European Commission Guidelines on Ethics and Data Protection [16] were observed, which guaranteed compliance with international standards in the handling of personalised medical information.

Results

Profile of cognitive impairment in the examined patients

The analysis of the cognitive status of the examined patients in the late recovery period after ischaemic stroke, performed at least six months after the acute event, showed a pronounced level of prevalence of cognitive deficit of various severity. According to the MoCA test results, 82.7% of participants (n = 81 out of 98) showed signs of cognitive decline: 37.8% (n = 37) showed mild impairment, 31.6% (n = 31) showed moderate impairment, and 13.3% (n = 13) showed severe cognitive impairment (MoCA total score<18) (Fig. 1). The mean MoCA score was 21.1 ± 3.9, which corresponds to moderate cognitive decline. In the control group patients, the mean score was within the normal range (27.6 ± 1.8), which confirmed the validity of the sample stratification.

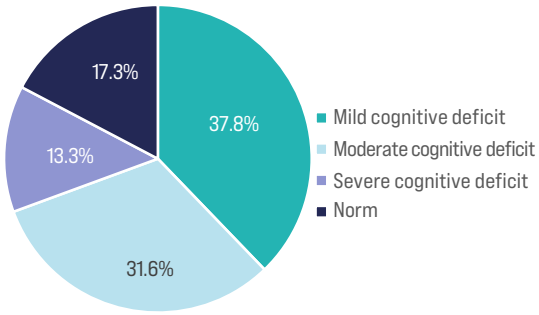

Figure 1. Distribution of patients in the experimental group (n = 98) by degree of cognitive deficit according to the results of the MoCA scale

Source: created by the author

The data presented in Figure 1 demonstrate the prevalence of mild to moderate cognitive impairment in the majority of patients in the late recovery period of stroke. This reflects the high clinical significance of even subclinical forms of cognitive deficits, which may stay undetected without targeted neuropsychological testing. The relatively small proportion of patients with severe impairment confirms that severe deficits are less widespread but require more intensive and multidisciplinary intervention. The presence of cognitive normality in only a limited number of respondents emphasises the need for mandatory screening of cognitive status as part of the standard post-stroke follow-up protocol, because even in the absence of subjective complaints, objective functional decline is recorded in the majority of cases.

The structure of cognitive deficits was dominated by disorders in the short-term memory domain: difficulties in reproducing 4-5 words in a time interval were recorded in 68.4% (n = 67) of patients in the experimental group. Attention concentration disorders assessed by serial subtraction and inverse repetition of digits were found in 60.2% (n = 59) of the patients. A considerable proportion of respondents expressed difficulties in orienting in time and place – 46.9% (n = 46), especially in the age subgroup over 70 years old. Challenges in performing abstract thinking and categorisation tasks were observed in 41.8% (n = 41) of patients and were closely related to the level of education: those with incomplete secondary education had a significantly lower level of abstract thinking ($p < 0.01$). Speech disorders, including nomination and repetition of phrases, were observed in 27.6% of cases (n = 27), while dysfunction of executive functions, manifested in difficulties in performing the clock drawing and cube copying tests, was recorded in 38.8% (n = 38) of patients (Fig. 2).

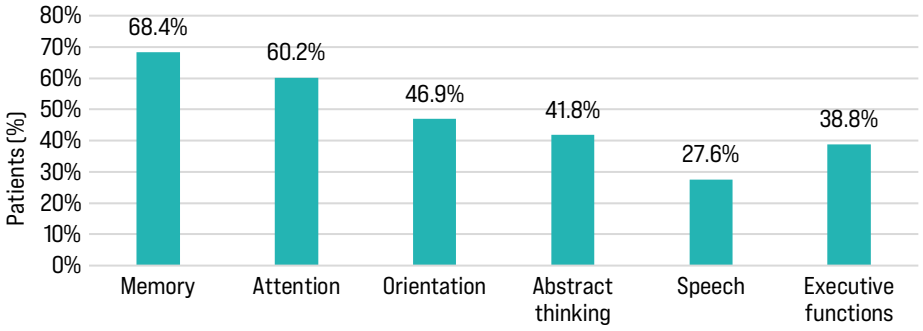

Figure 2. Distribution of cognitive impairment according to the main domains of the MoCA scale in patients of the experimental group (n = 98)

Source: created by the author

The data described in Figure 2 demonstrate that short-term memory and attention continue to be the most vulnerable cognitive domains in the late recovery period after ischaemic stroke. This indicates impaired retention, selective processing, and arbitrary switching of mental operations, which is particularly critical for adaptation in the domestic and social environment. Related deficits – in orientation, abstract thinking, speech production, and executive regulation – form a complex picture of cognitive dysfunction, in which not one but several brain systems that ensure everyday autonomy are affected.

The recorded cognitive profile is characterised not only by the severity of disorders, but also by their multilevel, synergistic interaction, which complicates both spontaneous recovery and the effectiveness of standard rehabilitation measures. The persistence of cognitive deficit six months after stroke reflects the need for its early diagnosis and targeted intervention considering the leading domain of the disorder. This substantiates the expediency of developing adapted cognitive routes in the system of outpatient care integrated into a multidisciplinary rehabilitation approach.

Structure of affective disorders in the late recovery period

According to the BDI-II depression scale, most patients (n = 98, experimental group) showed clinically significant depressive symptoms. Therewith, 34.7% of cases (n = 34) showed moderate depression, 28.5% (n = 28) showed severe depression, and another 9.2% of patients (n = 9) had major depressive disorders. Only 27.6% of participants (n = 27) had symptom levels that did not exceed the minimum values (Fig. 3). The mean BDI-II score was 19.6±7.4 points, indicating the severity of affective maladjustment. In the control group (n = 44), the mean score was significantly lower (7.2 ± 3.1 points), which confirms the reliability of stratification and excludes systemic bias in the sample distribution. The presented data indicate that the most patients in the late recovery period after ischaemic stroke experience various forms of depressive symptomatology. The most widespread are moderate and pronounced states, reflecting sustained emotional maladaptation requiring clinical attention. A relatively smaller proportion of patients exhibit major depression, but even minimal manifestations were recorded in only a limited

number of participants. This emphasises the need to include psycho-emotional assessment as part of the standard rehabilitation pathway.

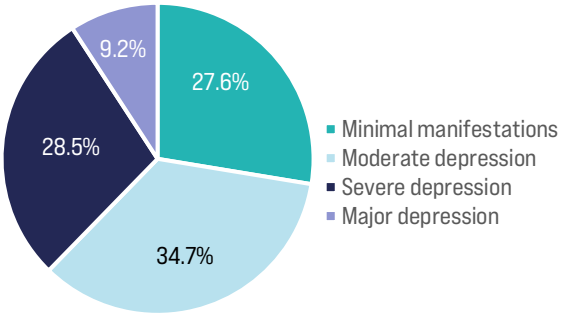

Figure 3. Distribution of forms of depressive symptomatology in patients of the experimental group (n = 98) according to the results of the BDI-II scale
Source: created by the author

Anxiety disorders were also well represented in the study sample. According to the results of the HAM-A anxiety scale, 45.9% of patients (n = 45) showed a moderate level of anxiety, and another 17.3% (n = 17) showed a pronounced level of anxiety. Typical manifestations were internal tension, feelings of threat, somatic complaints (dizziness, cardiopalmus, muscle tension), and sleep disturbances. The mean total score on the HAM-A was 21.3 ± 6.2, which corresponds to clinically significant anxiety. In the control group, this index was significantly lower – 9.5 ± 3.8.

The analysis of prognostic factors of the severity of affective disorders revealed a series of statistically significant associations reflecting the complex nature of emotional maladaptation in patients in the late recovery period of stroke. The most significant predictor was the severity of cognitive deficit: there was a stable inverse correlation between the final MoCA score and the level of depression on the BDI-II scale ($r = -0.52$; $p < 0.001$). This indicates that the deeper the impairment in the cognitive sphere – especially in the domains of memory, attention, and executive functions – the greater the severity of depressive symptomatology. Such a relationship supports the concept of neuropsychological overlap between frontal-limbic and cortical networks involved simultaneously in cognitive regulation and affective appraisal.

Gender also showed statistical significance, with women demonstrating greater values on average on both the BDI-II and HAM-A scales. The mean depression score among women was 4.3 points higher than in men ($p < 0.01$), and severe anxiety was almost twice as widespread. This may be due to greater psychoemotional sensitivity, the social role of caregivers, and the more frequent presence of loneliness in later life. Analysis of the internal structure of complaints showed that emotional symptoms (sadness, feelings of helplessness, tearfulness) were predominant in women and somatised symptoms (headache, sleep disorders, irritability) in men.

Age analysis revealed that patients over 70 years of age showed the greatest severity of both depressive and anxiety symptoms. Their mean BDI-II and HAM-A scores were statistically significantly greater than those of individuals aged 60-69 years ($p < 0.01$) and 50-59 years ($p < 0.05$). These differences are interpreted as a consequence of a complex of biopsychosocial factors, including decreased cognitive reserve, presence of chronic somatic diseases (ischaemic heart disease, diabetes mellitus, hypertension), loss of life perspective, decreased social activity, and lack of emotional support. In addition, apathetic forms of depression with low motivation and pronounced anaesthesia of feelings were more widespread in elderly patients, which aggravated recovery and worsened the prognosis for long-term adaptation.

Emotional lability, manifested as mood swings, irritability, tearfulness, and reduced tolerance to stress, was recorded in 38% of patients in the experimental group. Such manifestations often stayed underestimated at the initial neurological examination, but they significantly affected the effectiveness of cognitive rehabilitation and relationships with the environment. The analysis revealed that the combination of anxiety and depressive symptoms forms a stable affective profile, which requires the inclusion of specialised interventions in the structure of rehabilitation care. The introduction of brief validated questionnaires for initial screening and subsequent psychological support, especially in risk groups – women, elderly patients and those with severe cognitive deficits – seems to be the most appropriate.

The revealed structure of affective disorders in the late recovery period after ischaemic stroke demonstrates a high frequency of depressive and anxiety symptoms. They cannot be considered outside the context of cognitive status, sex, and age of the patient. These disorders considerably affect the overall functional status, recovery prognosis, and quality of life, and therefore require a systemic approach and interdisciplinary management.

Relation of cognitive-affective impairment to functional autonomy

One of the key objectives of the present study was to determine the relationship between the severity of cognitive and affective disorders and the level of daily functional independence in ischaemic stroke patients. The mean total score in the experimental group was 13.8 ± 3.4 out of a possible 20 points, corresponding to a moderate decrease in functional independence. 62 patients (63.3%) had significant limitations in at least three daily functions. The most frequent problems were difficulties in organising hygienic care, the need for external assistance with mobility, and reduced ability to adhere to medication. In the control group, the mean functional autonomy score was 18.2 ± 1.6, which was significantly greater ($p < 0.001$), and no severe limitations were recorded.

The analysis of correlations between the severity of cognitive impairment and the level of functional autonomy showed a statistically significant positive correlation between the final MoCA scores and the total autonomy score ($r = 0.43$; $p < 0.001$). A particularly pronounced relationship was observed for the domains of attention, memory, and executive function. Patients with MoCA scores below 20 showed insufficient self-regulatory ability, particularly planning and consistent performance of routine activities. Affective symptomatology also significantly affected day-to-day independence. When analysing the BDI-II scale data, a negative correlation was found between the level of depression and the functional autonomy score ($r = -0.38$; $p < 0.001$). Patients with severe depression (BDI-II score >29 points, $n = 9$) had a mean autonomy score of only 10.3±2.1, whereas those with minimal depressive symptoms had a mean autonomy score of 17.6 ± 1.8. Anxiety, as assessed by the HAM-A scale, also showed a moderately significant negative effect ($r = -0.31$; $p < 0.01$), especially when combined with somatic complaints and sleep disturbances.

Stratified analyses revealed that women had a lower functional independence level by an average of 2.4 points compared to men ($p < 0.05$), with differences persisting even when the degree of cognitive deficit was comparable. In the age subgroup older than 70 years ($n = 29$), the level of autonomy was significantly lower compared to patients younger than 60 years (mean 12.1 ± 3.7 vs. 15.9 ± 2.8; $p < 0.01$). This may be explained by the complex influence of age-related changes, social isolation, and reduced physical activity levels. Additionally, subgroup analyses were performed: with isolated cognitive impairment ($n = 26$), isolated affective symptoms ($n = 18$) and combined cognitive-affective disorders ($n = 54$). The latter subgroup showed the worst performance on all questionnaire items: more than 70% of participants in this group needed assistance with four or more daily functions. The mean autonomy score was 12.4 ± 2.9, 4.3 points lower than in patients without significant neuropsychological symptoms ($p < 0.001$).

The obtained results reflect a pronounced relationship between cognitive-affective disorders and a decrease in the level of functional independence in patients in the late recovery period after ischaemic stroke. Of particular clinical significance are the domains of attention, planning, and emotional motivation, the impairment of which leads to a reduced ability to adapt to the demands of everyday life. This underlines the need for systemic neuropsychological monitoring in post-stroke practice, as well as the development of comprehensive support programmes aimed not only at restoring lost cognitive functions, but also at stabilising the emotional background and teaching strategies of everyday self-management.

Comparative analysis of clinical and psychological profiles in the experimental and control groups

Comparative analysis of clinical and psychological characteristics of patients with pronounced cognitive-affective disorders (experimental group) and without them (control group) revealed fundamental differences in the structure of symptoms, the level of functional autonomy, and the quality of post-stroke recovery. In the experimental group, as shown by the data of neuropsychological testing, moderate and severe cognitive disorders prevailed, which was accompanied by pronounced affective symptomatology. In the control group, clinically significant disorders were not registered, except for isolated cases of mild anxiety. The structure of disorders in the experimental group was characterised by multidomain cognitive deficit and pronounced level of emotional lability, while in the control group the preservation of neuropsychological functions within the age norm prevailed.

Comparative analysis of the MoCA scale showed that in the experimental group the mean score was 21.1 ± 3.9, corresponding to a moderate cognitive decline, while in the control group it was significantly greater – 27.6 ± 1.8 ($p < 0.001$). The differences were particularly significant on the subscales of short-term memory, abstract thinking, and attention, where the experimental group showed pronounced difficulties in task performance. Similarly, the mean score on the BDI-II scale in the experimental group was 19.6 ± 7.4, reflecting moderately severe depression, while in the control group this score was 7.2 ± 3.1 ($p < 0.001$). Anxiety, as measured by the HAM-A scale, also differed significantly between groups: 21.3 ± 6.2 vs. 9.5 ± 3.8 respectively ($p < 0.001$). In terms of functional autonomy, patients in the experimental group showed marked limitations in daily activities. The mean self-care scale score was 13.8 ± 3.4 versus 18.2 ± 1.6 in the control group ($p < 0.001$). Differences were particularly pronounced in the ability to move independently, medication adherence and personal hygiene. To clarify the differences between the groups, multivariate analysis of variance was performed, which revealed statistically significant interactions between neuropsychological profile and the degree of functional autonomy ($p < 0.01$) (Table 1).

Table 1. Comparative indices of neuropsychological and functional in the experimental and control groups

Indicator	Experimental group (n = 98)	Control group (n = 44)
MoCA average score	21.1 ± 3.9	27.6 ± 1.8
BDI-II average score	19.6 ± 7.4	7.2 ± 3.1
HAM-A average score	21.3 ± 6.2	9.5 ± 3.8
Functional autonomy score	13.8 ± 3.4	18.2 ± 1.6

Source: created by the author

These data demonstrate that the participants of the experimental group had a complex combination of cognitive deficits and pronounced affective disorders, which substantially aggravated the level of daily dependence. In contrast, the control group maintained both cognitive and emotional stability, which correlated with a pronounced level of independence. Such a differentiated profile indicates not just the presence of isolated impairments, but a systemic deterioration of cognitive-affective regulation affecting daily activity. This allows considering these differences as clinically significant markers of recovery prediction and the basis for stratification of approaches to outpatient rehabilitation.

Stratification by age and sex also revealed certain differences within the groups. In the experimental group, women had greater scores on depression and anxiety scales and lower levels of functional autonomy. Severe cognitive and affective disorders were more widespread among patients older than 70 years (n = 29), which was reflected in the overall clinical picture and required more intensive intervention. The results also demonstrated that the presence of cognitive impairment had a more pronounced impact on daily functioning than affective symptomatology. However, when they are combined, the effect is exacerbated, forming a complex rehabilitation task. Patients with pronounced symptoms of depression and anxiety showed low motivation for recovery, increased fatigue, and decreased participation in rehabilitation programmes.

Thus, the obtained data confirm the significance of considering cognitive-affective status when planning post-stroke care. Comparative analysis clearly demonstrates that patients with pronounced neuropsychological disorders require more intensive, personalised support, including both psychotherapeutic and cognitive rehabilitation components. It is also necessary to develop outpatient support programmes and to train patients in deficit compensation strategies, which will improve the quality of life and increase the efficiency of stroke recovery.

Discussion

The obtained data confirmed that cognitive and affective disorders are frequent and clinically significant consequences of ischaemic stroke in the late recovery period. Their severity is directly related to the level of functional autonomy and requires complex interpretation in comparison with the results of scientific studies.

The primary analysis revealed that cognitive impairments of varying severity were recorded in 82.7% of ischaemic stroke patients, with short-term memory and attention deficits predominating. The mean MoCA score in the experimental group was 21.1 ± 3.9, which corresponds to a moderate decline in cognitive function. These data confirmed the high prevalence of multidomain cognitive deficits even six months after the acute event. Comparable results were obtained in a multicentre study by M. Mancuso *et al.* [17], which found that even in the subacute course of ischaemic stroke, cognitive recovery is partial and directly affects rehabilitation outcomes. Analogously, Y.M. Yang *et al.* [18] showed that patients with mild stroke have significant and sustained changes in a battery of neuropsychological tests, especially in the areas of executive functions and working memory. The role of spatial-localisation factors was confirmed in the study by A. Tsiakiri *et al.* [19], where the researchers found that the cognitive profile after stroke varies depending on the lateralisation of the lesion: left-hemispheric strokes are more often accompanied by speech and memory impairments, whereas right-hemispheric strokes are more often accompanied by deficits in visual-spatial and executive functions. These findings support the results of the present study, which revealed the multidomain nature of cognitive impairment, reflecting the involvement of different functional brain systems and highlighting the need for a personalised approach to cognitive rehabilitation. Additionally, N.S. Rost *et al.* [20] stated that post-stroke cognitive disorders often persist in the form of dementia, especially in elderly patients, and represent a long-term prognostic threat despite therapy.

The mean severity of depressive symptomatology in patients in the late recovery period after stroke reached 19.6 ± 7.4 points on the BDI-II scale. Severe depression was detected in 28.5% of respondents, and in 9.2% – major depression, reflecting a stable nature of emotional maladaptation, not inclined to spontaneous remission. The detected combination of anxiety and depressive symptoms was accompanied by increased fatigue, decreased motivation and sleep disturbance, which negatively affected neuropsychological rehabilitation. N. Butsing *et al.* [21] confirmed that post-stroke depression is associated with significant deterioration of functional outcomes, with the presence of severe affective symptoms being an independent predictor of poor rehabilitation performance. In a six-month prospective study, L.P. Beltrami *et al.* [22] demonstrated high stability of depressive states that persisted even in the absence of somatic progression. However, in contrast to the present study, where emotional manifestations (sadness, helplessness) predominated, F.G. Masuccio *et al.* [23] identified predominantly apathetic forms in older individuals, indicating an age-related transformation of the clinical phenotype. U. Sagen-Vik *et al.* [24] reported that anxiety-depressive disorders after stroke often proceed in a wave-like manner, with recurrences over two years, whereas the present study recorded their relative plateau in the late recovery period. The complex of available data confirms the high frequency and clinical significance of affective disorders in the late post-stroke period. Their presence has an unfavourable impact on cognitive recovery, functional autonomy, and general adaptation, which substantiates the need for systematic monitoring and interdisciplinary management.

The established inverse correlation between the level of cognitive functioning and the degree of depressive symptoms ($r = -0.52$; $p < 0.001$), and between cognitive deficit and anxiety ($r = -0.31$; $p < 0.01$) reflects a strong relationship between affective dysregulation and neurocognitive failure. Patients with combined disorders had the lowest autonomy scores and the highest frequency of complaints of emotional instability, emphasising the clinical significance of cognitive-affective overlap in recovery prognosis. According to B. Ghabel Damirchi *et al.* [25], patients with post-stroke depression are more likely to show impairments in executive function, information processing speed and episodic memory. These results are consistent with the current observations in which exactly these domains appeared to be the most vulnerable in individuals with severe affective disorders. Using generative mapping algorithms, A.K. Bonkhoff *et al.* [26] showed that cognitive deficits after stroke are caused by lesions of networks simultaneously involved in emotional regulation (frontal-limbic and frontoparietal circuits), which confirms the biological basis of the identified relationship. As shown in the meta-analysis by S. Lugtmeijer *et al.* [27], post-stroke working memory dysfunction is the most frequent and pronounced form of cognitive deficit, especially in the presence of concomitant decreased stress tolerance and anxiety-depressive symptoms. This trend is directly confirmed in the results of the present study: patients with pronounced affective disorders were significantly more likely to demonstrate decreased attention concentration, difficulties in performing attention switching and serial counting tasks – markers of impairment of working cognitive modules responsible for the integration and regulation of information. M. Lee *et al.* [28] showed that the predictive accuracy of risk assessment of post-stroke cognitive deficit increases with the inclusion of affective parameters – anxiety, anhedonia, emotional numbness. These findings correlate with the fact revealed in the study of a more pronounced decrease in the cognitive profile in individuals with severe depression and anxiety. The lowest MoCA scores were recorded in the subgroup with combined cognitive-affective disorders ($n = 54$), which emphasises their interacting and mutually reinforcing nature.

Emotional lability, including increased irritability, tearfulness, mood swings and low stress tolerance, was recorded in 38% of patients in the experimental group. Together with clinically significant depression (72.4%) and anxiety (63.2%), these manifestations formed a stable affective profile that significantly reduced motivation for recovery and the level of participation in rehabilitation activities. In this subgroup, the mean autonomy scale score was only 12.4 ± 2.9, which was 4.3 points lower than in patients without significant neuropsychological symptoms ($p < 0.001$). Additionally, there were complaints of fatigue, difficulties in maintaining a daily routine, and pronounced sleep disturbances, especially in those over 70 years of age and women. The results agree with the findings of J. Tay *et al.* [29], who found that post-stroke apathy differs from depression by low level of initiative and weak emotional reactivity associated with functional dysfunction of mediofrontal structures. I. Kirchberger *et al.* [30] emphasised that post-stroke fatigue persists regardless of the initial stroke severity and often predisposes to a decrease in life activity and social engagement. Analogously, E. Douven *et al.* [31] associated apathy with frontal and cingulate regions of the brain, the lesion of which leads to impoverished emotional background, which was observed in a considerable proportion of patients with severe depression in this study ($n = 9$; BDI-II > 29). According to A.G. Damsbo *et al.* [32], the risk of emotional exhaustion after stroke increases in the presence of social isolation factors and chronic comorbidities – such as hypertension and coronary heart disease, which were presented in more than half of the participants in the age group ≥70 years.

Analysis of gender-age differences showed that women in the late recovery period of stroke demonstrated more affective symptoms and less functional autonomy: mean BDI-II score was 4.3 points higher compared to men ($p < 0.01$) and self-care was 2.4 points lower ($p < 0.05$), despite a comparable degree of cognitive deficit. In the age subgroup ≥70 years, cognitive decline, level of depression and autonomy impairment reached critical values, indicating the complex nature of maladaptation in the elderly. Therewith, in the group of 50-59 years old, the indicators stayed within moderate values. These results are consistent with the data of A. Ejaz *et al.* [33], according to which cognitive deficit and dementia in elderly patients have the most pronounced impact on the quality of life and independence, especially in persons experiencing social isolation. C.L. Beckenkamp *et al.* [34] noted that in the absence of rehabilitation support, the deterioration of neuropsychological functions and functional independence proceeds especially rapidly in the group of elderly women. S. Bártlová *et al.* [35] described analogous patters, finding that women after stroke have lower subjective satisfaction with life and recovery than men, despite comparable stroke severity, due to a combination of emotional overload, loneliness, and limited access to psychosocial resources. Review by A.S. Shamshiev *et al.* [36] highlighted that in countries with developing medical care systems, it is older women who stay in the least favourable position in terms of access to specialised rehabilitation and psychological support, which increases the risks of chronic dependence.

The discussion confirmed that cognitive and affective disorders are closely related to the level of functional autonomy in patients in the late recovery period of stroke. The greatest vulnerability was demonstrated in elderly patients and in women with co-morbid symptomatology accompanied by significant dependence.

Comparison with the results of other scientific studies confirmed the reproducibility of key trends and emphasised the significance of individual and social risk factors.

Conclusions

Cognitive impairment persisted in most patients six months after stroke (82.7%) and was characterised by a decline in short-term memory, attention, and orientation. The mean MoCA score was 21.1 ± 3.9, corresponding to a moderate cognitive deficit. This structure of disorders reflects persistent suffering of frontal-parietal functional systems and limits the patient's ability for independent daily activity. Affective disorders, detected in 72.4% of the examined patients, significantly complicated recovery, reducing motivation and resistance to load. Mean BDI-II (19.6 ± 7.4) and HAM-A (21.3 ± 6.2) scores reflect the prevalence of moderate to severe symptoms. The most vulnerable were patients with severe depression (9.2%) and pronounced anxiety, which requires mandatory consideration of the affective element in rehabilitation planning. Functional autonomy of patients was inversely proportional to the severity of neuropsychological disorders. In the presence of severe depression, the autonomy index decreased to 10.3 ± 2.1 points, whereas in the general group it was 13.8 ± 3.4. The established correlations with MoCA (r = 0.43), BDI-II (r = -0.38) and HAM-A (r = -0.31) results confirmed the systemic influence of cognitive-affective distress on everyday autonomy.

Comparison with the control group confirmed the presence of pronounced differences in all key indicators. Stroke patients had lower MoCA values (21.1 ± 3.9 vs 27.6 ± 1.8), greater levels of depression (19.6 ± 7.4 vs 7.2 ± 3.1) and anxiety (21.3 ± 6.2 vs 9.5 ± 3.8), and lower functional autonomy (13.8 ± 3.4 vs 18.2 ± 1.6), with statistically significant differences on all scales. These data indicate the systemic nature of neuropsychological consequences of ischaemic stroke and underline the importance of their targeted correction already in the posthospital period. The greatest degree of cognitive-affective vulnerability was demonstrated by women and patients of the older age group. In women, the level of depression averaged 21.3 ± 7.1 points, autonomy – 12.8 ± 3.2, which was statistically worse compared to men. Those over 70 years of age had the worst scores on all scales: MoCA – 18.4 ± 3.2, BDI-II – 23.6 ± 6.8, autonomy – 12.1 ± 3.7. This emphasises the need for an age- and gender-specific approach to rehabilitation and support.

The key limitation of this study was the relatively small sample size, which limited the ability to generalise the findings to a wider population of post-stroke patients. Future studies may include a larger and more representative sample to clarify the factors influencing the severity and duration of cognitive-affective impairment at various stages of post-stroke recovery.

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Conflict of Interest

None.

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Ишемиялык инсульттун кеч калыбына келтирүү мезгилиндеги аффективдүү жана когнитивдик бузулуулар

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Аннотация. Изилдөөнүн максаты кеч калыбына келтирүү мезгилинде ишемиялык инсульт менен ооруган бейтаптардын нейропсихологиялык өзгөчөлүктөрүн жана функционалдык автономия даражасын аныктоо болгон. Методика 50-80 жаштагы 142 бейтапты когорттук салыштырма текшерүүгө негизделип, Кыргыз мамлекеттик дипломдон кийинки билим берүү медициналык институтунун жана «Аманат» университеттик клиникасынын катышуусу менен клиникалык база катары когнитивдик функцияларды, депрессияны, тынчсызданууну жана функционалдык автономия анкетасын баалоо шкалаларын колдонуу менен жүргүзүлгөн. Изилдөөнүн негизги натыйжалары ишемиялык инсульттун кеч калыбына келтирүү мезгилиндеги пациенттерде нейропсихикалык бузулуулардын жогорку таралышын көрсөттү. Когнитивдик жетишсиздиктер текшерилген пациенттердин 82,7 %да сакталып, когнитивдик функцияны баалоо шкаласы боюнча орточо балл 21,1 баллды түзгөн. Эң байкалган бузулуулар кыска мөөнөттүү эс тутум (68,4 %), көңүл буруу (60,2 %) жана ориентация (46,9 %) болгон. Катышуучулардын 72,4 %ында аффективдүү бузулуулар аныкталган, 9,2 %да катуу депрессия жана 28,5 % да ачык депрессия; депрессия шкаласы боюнча орточо көрсөткүч 19,6 баллды түздү. тынчсызданууу деңгээл 21,3 Гамильтон тынчсызданууу шкаласы боюнча орточо балл менен, бейтаптардын 63,2 % клиникалык босогодон ашты. Негизги топто функционалдык автономиянын орточо баасы 13,8 баллды түздү, ал эми катуу депрессия менен ооруган бейтаптарда 10,3кө чейин төмөндөгөн. Аялдар эркектерге караганда көбүрөөк айкын аффективдүү симптомдорду жана автономиянын төмөн деңгээлин көрсөтүшкөн. 70 жаштан жогорку курак подгруппасында башка курак категорияларына салыштырмалуу когнитивдик функциялардын бир кыйла айкын төмөндөшү жана аффективдүү бузулуулардын көбөйүү тенденциясы байкалган. Көпчүлүк пациенттерде аныкталган когнитивдик-аффективдүү бузулуулар күнүмдүк автономияга системалуу таасир этет жана ооруканадан кийинки мезгилде комплекстүү оңдоону талап кылат. Алынган натыйжалар невропатологдор, психиатрлар жана реабилитациялык адистер үчүн практикалык мааниге ээ, анткени алар инсульттан кийинки кеч мезгилде пациенттерге нейропсихологиялык колдоо көрсөтүүнүн жекелештирилген программаларын иштеп чыгууда колдонулушу мүмкүн

Негизги сөздөр: нейропсихикалык бузулуулар; функционалдык автономия; депрессия; когнитивдик функциялар; тынчсызданууу; эс тутум; көңүл

Аффективные и когнитивные расстройства в позднем восстановительном периоде ишемического инсульта

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Аннотация. Цель исследования заключалась в выявлении нейропсихологических особенностей и степени функциональной автономии у пациентов с ишемическим инсультом в позднем восстановительном периоде. Методология базировалась на когортном сравнительном обследовании 142 пациентов в возрасте 50-80 лет, проведённом при участии Кыргызского государственного медицинского института последипломного образования и университетской клиники "Аманат" как клинической базы с использованием шкал для оценки когнитивных функций, депрессии, тревожности и опросника функциональной автономии. Основные результаты исследования продемонстрировали высокую распространённость нейропсихологических нарушений у пациентов в позднем восстановительном периоде ишемического инсульта. У 82,7 % обследованных сохранялись когнитивные дефициты, при среднем показателе по шкале оценки когнитивных функций – 21,1 балла. Наиболее выраженными оказались нарушения кратковременной памяти (68,4 %), внимания (60,2 %) и ориентировки (46,9 %). Аффективные расстройства были выявлены у 72,4 % участников, причём тяжёлая депрессия установлена у 9,2 %, а выраженная – у 28,5 %; среднее значение по шкале депрессии составило 19,6 балла. Уровень тревожности превышал клинический порог у 63,2 % пациентов, при среднем балле по шкале тревожности Гамильтона – 21,3. Средняя оценка функциональной автономии в основной группе составила 13,8 балла, а у пациентов с тяжёлой депрессией снижалась до 10,3. Женщины демонстрировали более выраженные аффективные симптомы и более низкий уровень автономии по сравнению с мужчинами. В возрастной подгруппе старше 70 лет наблюдалась тенденция к более выраженному снижению когнитивных функций и усилению аффективных нарушений по сравнению с другими возрастными категориями. Когнитивно-аффективные расстройства, выявленные у большинства пациентов, оказывают системное влияние на повседневную автономию и требуют комплексной коррекции уже в постгоспитальный период. Полученные результаты представляют практическую ценность для неврологов, психиатров и реабилитологов, поскольку могут быть использованы при разработке индивидуализированных программ нейропсихологической поддержки пациентов в позднем постинсультном периоде

Ключевые слова: нейропсихологические нарушения; функциональная автономия; депрессия; когнитивные функции; тревожность; память; внимание