

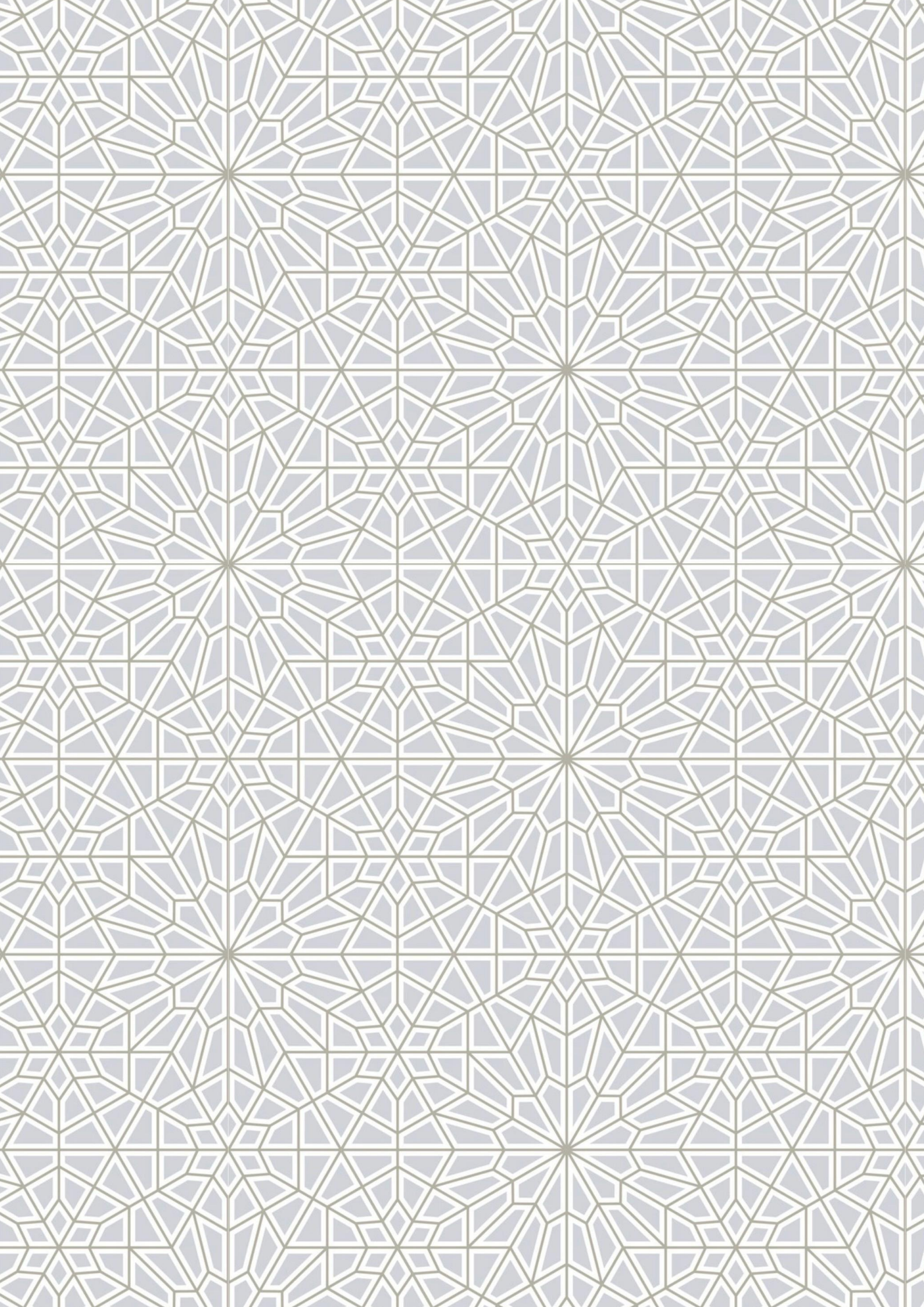


O'ZBEKISTON HARBIY

2025-YIL, 2-SON

ТИББИЙОТ





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Телефонлар: (71) 262-42-41

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THE IMPACT OF ISCHEMIC STROKE LATERALIZATION ON CLINICAL-NEUROLOGICAL AND COGNITIVE-EMOTIONAL MANIFESTATIONS

ALFIYA MURADIMOVA RASHIDOVNA,

Department Head of Neurology and Psychiatry,

Fergana Institute of Public Health,

PhD, Associate Professor

MADZHIDOVA YOKUTHON NABIYEVNA,

Head of the Department of Neurology, Pediatric Neurology, and Medical Genetics,

Tashkent Medical University,

Doctor of Medical Sciences, Professor

Abstract: Ischemic stroke continues to be a major contributor to disability and mortality across the globe. In the field of clinical neurology, increasing focus is placed on understanding how the lateralization of brain lesions influences the type and intensity of neurological, cognitive, and emotional disturbances. This research explores the clinical-neurological and cognitive-emotional manifestations in patients with ischemic strokes affecting either the left or right cerebral hemisphere. A comparative assessment was performed to evaluate the prevalence and severity of conditions such as aphasia, spatial neglect, depression, anxiety, and cognitive deficits at various stages of the recovery process. The results underscore the critical role of stroke lateralization in shaping neurorehabilitation approaches and forecasting clinical outcomes.

Keywords: brain ischemia, brain hemisphere involvement, neurological impairment, mental performance decline, emotional dysfunctions, left-sided brain ischemia, right-sided brain ischemia, verbal communication deficit, spatial unawareness, depression following stroke

Аннотация: Ишемический инсульт остаётся одной из ведущих причин инвалидизации и смертности в мире. Особое значение в клинической неврологии приобретает изучение влияния латерализации очага поражения на характер и выраженность неврологических, когнитивных и эмоциональных расстройств. В настоящей работе рассмотрены особенности клинико-неврологической и когнитивно-эмоциональной симптоматики у пациентов с инсультом, локализованным в левом и правом полушариях головного мозга. Проведён сравнительный анализ частоты и выраженности афазии, пространственного неглекта, депрессии, тревожных расстройств и когнитивного дефицита на разных сроках восстановительного периода. Полученные данные подчеркивают необходимость учёта латерализации инсульта при планировании нейрореабилитационных мероприятий и прогностической оценке исходов заболевания.

Ключевые слова: ишемический инсульт, латерализация, клинико-неврологический дефицит, когнитивные нарушения, эмоциональные расстройства, левополушарный инсульт, правополушарный инсульт, афазия, неглект, постинсультная депрессия.

Relevance

In recent years, the diagnosis and treatment of vascular system diseases have gained increasing importance. According to the World Health Organization, acute cerebrovascular accidents represent the third leading cause of mortality in developed nations, following ischemic heart disease and malignancies. In the Commonwealth of Independent States (CIS), however, stroke remains the primary cause of death [1,4]. Findings from international multicenter studies, corroborated by data from the Chief Neurologist of Uzbekistan, B.G. Gafurov,

indicate that the incidence ratio of hemorrhagic to ischemic stroke is approximately 1.2:4.8. The severe consequences of ischemic stroke warrant particular attention, as nearly 80% of affected individuals experience long-term disability. Furthermore, mortality rates reach up to 29% during the acute phase and rise to 59% by the end of the first post-stroke year.

The number of individuals with disabilities caused by stroke worldwide currently exceeds 2 million. Stroke significantly alters not only the life of the patient but also that of their family members and caregivers [13,14].

In Uzbekistan, more than 64,000 cases of stroke are registered annually.

Early rehabilitation following a cerebrovascular accident (CVA) remains one of the most critical challenges in contemporary neurology, given that approximately one-third of stroke survivors experience a loss of occupational capacity. A key factor contributing to long-term disability in these individuals is the heterogeneity of motor impairments, which results from dysfunction in various components of the motor control system[3–6].

In addition to motor deficits, a substantial proportion of patients develop disorders of higher cortical functions, including cognitive decline and impairments within the emotional, motivational, and personality domains. Understanding the etiopathogenesis and molecular underpinnings of stroke—alongside the timely detection and correction of neuropsychological disturbances—is crucial, as these factors significantly influence the prognosis of rehabilitation, as well as the overall duration and quality of post-stroke life [9,11].

In certain cases, neuropsychological deficits may constitute the sole or predominant clinical manifestation of stroke. The investigation of interhemispheric interactions and the functional asymmetry of the cerebral hemispheres has emerged as a particularly promising area of research in clinical neurology, especially in the context of post-stroke recovery [7–9].

Of particular clinical significance are the neuropsychological syndromes resulting from focal lesions in either the right or left cerebral hemisphere during the acute phase of stroke. These syndromes may, at times, represent the only or the leading neurological manifestation of cerebral damage[11–12].

Objective

The primary aim of this study was to evaluate the severity of cognitive and psycho-emotional disturbances in patients with ischemic stroke involving either the right or left cerebral hemisphere during the early recovery phase.

Materials and Methods

This prospective study was conducted between 2023 and 2024 at the neurology departments of the private medical centers “Reacenter-Fergana” and “NEURO CARE” in Fergana, Uzbekistan. A total of 90 patients were enrolled, all with a verified diagnosis of ischemic stroke localized to the carotid territory, specifically involving the anterior and middle cerebral arteries, during the early recovery period.

The study cohort included both male and female participants aged between 40 and 80 years. A prerequisite for inclusion was the presence of right-hand dominance prior to the cerebrovascular event.

Upon admission, all patients underwent comprehensive clinical-neurological assessment and mental status monitoring to determine their rehabilitation potential. In all cases, the course of the disease was deemed favorable. Mental evaluation—including assessments of cognitive function, emotional and motivational status, and behavioral responses—was conducted during the early recovery phase, starting from day 30 following stroke onset.

Participants were stratified into two cohorts according to the lateralization of the ischemic lesion:

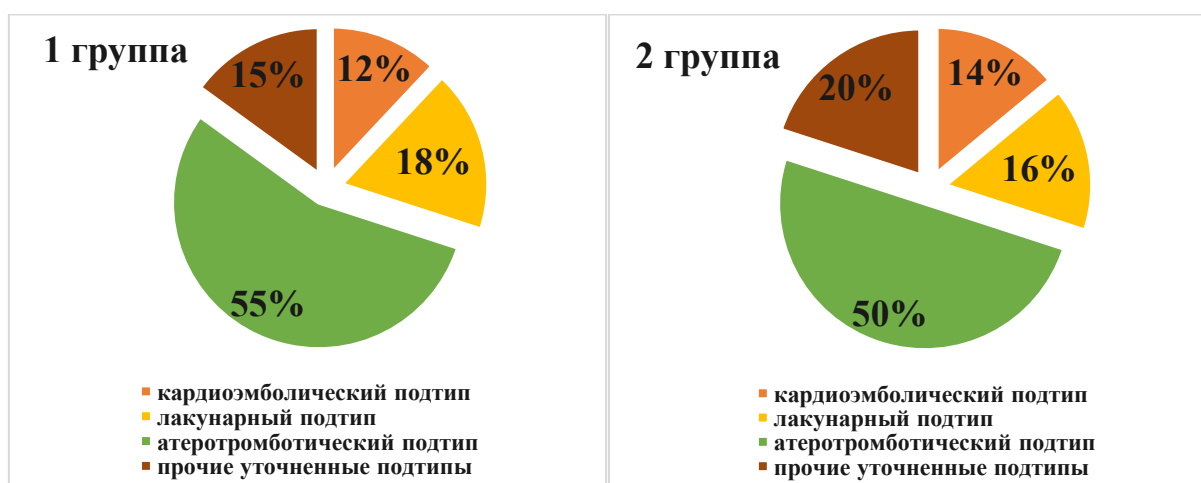
- Group 1 consisted of 45 patients with ischemic lesions localized in the right cerebral hemisphere, comprising 19 males (30%) and 26 females (60%), with a mean age of 63 ± 9.1 years.

- Group 2 included 45 patients with left-hemispheric infarcts, including 25 males (56.6%) and 20 females (43.4%), with a mean age of 61 ± 8.2 years.

Comparative analysis revealed no statistically significant differences between the two groups regarding age or gender distribution ($p > 0.05$).

Based on clinical symptomatology, neuroimaging data, and laboratory findings, the subtypes of ischemic stroke diagnosed within the study population were categorized. The distribution of these subtypes across the two groups is illustrated in Figure 1.

Figure 1. Classification of ischemic stroke subtypes in patients with right- versus left-hemispheric cerebral involvement



Psychoneurological Evaluation. A comprehensive psychoneurological assessment was conducted utilizing a battery of standardized instruments:

1. Neurological deficits were quantified using the National Institutes of Health Stroke Scale (NIHSS).

2. Cognitive function was evaluated through the Montreal Cognitive Assessment (MoCA).

3. Emotional status was assessed using the Hospital Anxiety and Depression Scale (HADS) and the Starkstein Apathy Scale.

4. Asthenic symptoms were measured with the Multidimensional Fatigue Inventory (MFI-20).

5. Perceived locus of control was determined via Rotter's Locus of Control Scale.

Data analysis was performed using IBM SPSS Statistics version 23, with the level of statistical significance set at $p < 0.05$.

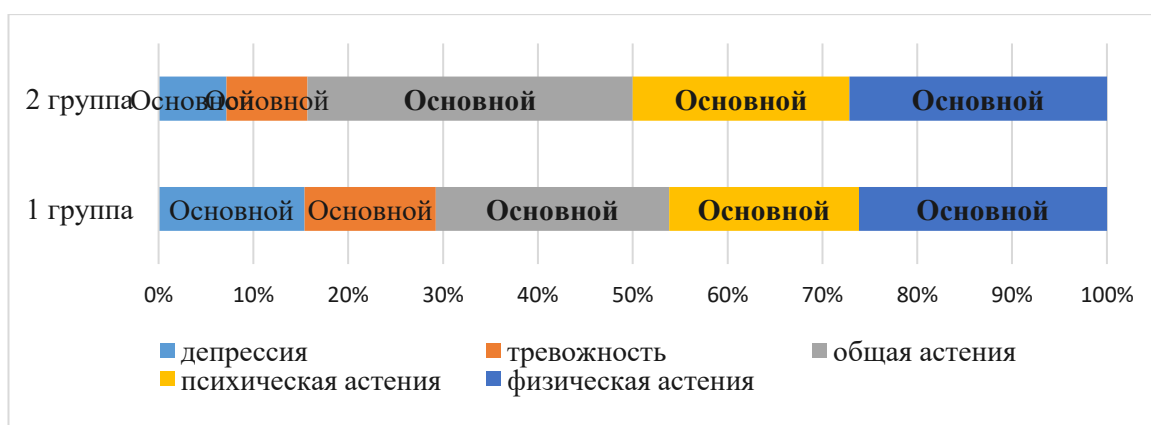
Results

Before initiating the main testing procedures, all patients underwent clinical examination to assess somatic and neurological status. At the time of the psychoneurological assessment, all participants were classified as being in satisfactory general condition under ongoing baseline treatment, with stable hemodynamic parameters.

Upon admission to the rehabilitation program, neurological status was evaluated using NIHSS scores. The median NIHSS score in Group 1 (patients with right-hemispheric infarcts) was 7.0 [5.0; 11.0], whereas in Group 2 (patients with left-hemispheric lesions), it was 6.0 [5.0; 10.0].

Both groups were administered the HADS, Starkstein Apathy Scale, and MFI-20 to assess emotional well-being and fatigue-related symptoms. The outcomes of these assessments are illustrated in Figure 2.

Figure 2. Psycho-emotional and asthenic symptom severity in patients with right- and left-hemispheric ischemic stroke



Analysis of the Results

The analysis of the collected data identified depressive symptoms as a clinically relevant factor, with patients in Group 1 (right-hemispheric stroke) exhibiting statistically significantly higher depression scores compared to those in Group 2 (left-hemispheric stroke). The average depression score was 4.2 ± 1.2 , which corresponds to a moderate level of depression.

Furthermore, the distress level among patients in Group 1 was also significantly elevated relative to Group 2. However, the mean value of 7.4 ± 2.6 points remained within the normative range (cut-off: ≤ 10 points), indicating subclinical manifestations.

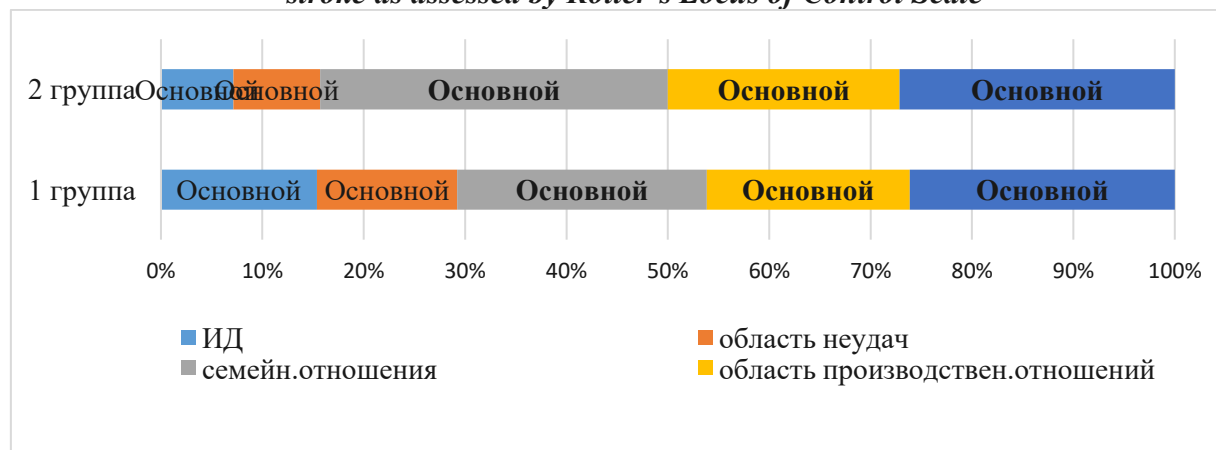
Assessment of fatigue-related symptoms using the Multidimensional Fatigue Inventory (MFI-20) demonstrated that participants in Group 2 experienced statistically higher levels of both general and mental fatigue compared to Group 1. The elevated general fatigue score (13.4 ± 1.8) may suggest the

presence of asthenic syndrome, while the mental fatigue score (11.4 ± 2.4) corresponds to mild asthenic symptoms (threshold: < 12 points).

No statistically significant differences were identified between the groups for the remaining variables assessed by the applied scales ($p > 0.05$).

Results from the Rotter's Locus of Control Scale are presented in Figure 3. An analysis of internality subdomains revealed that among the six measured dimensions, those related to interpersonal relationships and health/illness beliefs were the most informative. Patients in Group 2 exhibited a significantly lower level of perceived internal control in the domain of interpersonal interactions ($p = 0.002$), whereas individuals in Group 1 demonstrated significantly lower internality scores in the health and illness domain ($p = 0.004$). No significant group differences were observed in the other subscales of the Rotter instrument ($p > 0.05$).

Figure 3. Subjective control levels in patients with right- and left-hemispheric ischemic stroke as assessed by Rotter's Locus of Control Scale



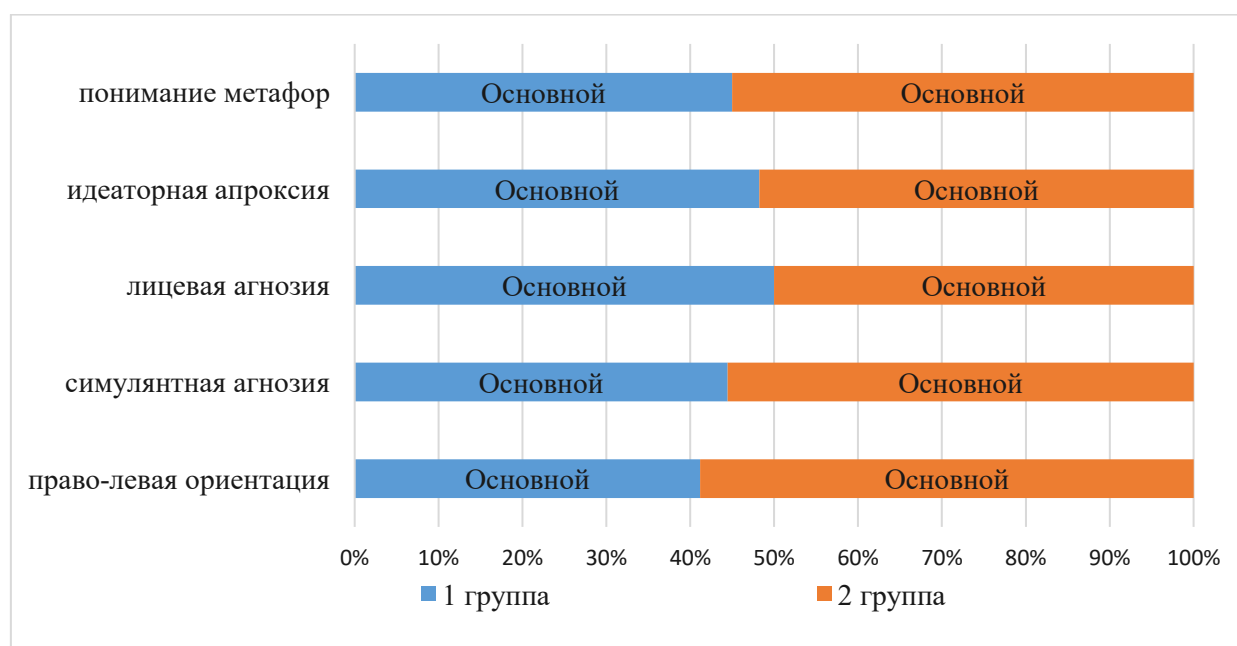
Cognitive performance was evaluated using the Montreal Cognitive Assessment (MoCA) scale. To enhance the sensitivity of the assessment—particularly for cognitive deficits associated with right-hemispheric cerebral lesions—the core MoCA battery was supplemented with additional subtests, including evaluations of right-left orientation, simultaneous agnosia, facial agnosia, ideational apraxia, and metaphor comprehension. The results of these assessments are illustrated in Figure 4.

Based on performance on the extended MoCA subscales, patients in Group 1 (right-hemispheric stroke) demonstrated statistically significantly lower scores than those in Group 2 on several specific cognitive domains: Ideational apraxia ($p = 0.000$), Metaphor comprehension ($p = 0.006$), Orientation in space and time ($p = 0.025$).

These data suggest that patients with right-hemispheric ischemic lesions experience a more severe degree of cognitive dysfunction,

particularly in areas related to praxis, abstract reasoning, and spatiotemporal orientation.

Figure 4. Evaluation of cognitive function using the MoCA scale with additional subtests in patients with ischemic stroke



Discussion

In both study groups, the acute phase of ischemic stroke localized within the anterior and middle cerebral artery territories was marked by the presence of motor, cognitive, behavioral, and psycho-emotional disturbances.

Among patients with right-hemispheric lesions, a pattern emerged characterized by moderate depressive symptoms, a predominant use of maladaptive cognitive and behavioral coping mechanisms, and a reduced level of self-regulation regarding health-related behaviors.

The most significant cognitive impairments in this group were observed in ideational praxis, metaphorical comprehension, and spatiotemporal orientation.

In contrast, individuals with left-hemispheric damage exhibited a moderate degree of general asthenia and demonstrated a greater reliance on adaptive or conditionally adaptive coping strategies.

However, this cohort also showed low subjective control in interpersonal domains, as assessed by the Rotter's Locus of Control Scale, suggesting a tendency to externalize

responsibility and attribute events—including illness onset—to external factors.

The prevalence of behavioral disturbances, along with diminished executive functioning and non-verbal working memory deficits in patients with right-sided strokes, corresponds with existing evidence emphasizing the critical role of the right hemisphere in the regulation of these cognitive domains.

Evaluation of emotional and motivational parameters revealed patterns aligning with the “valence hypothesis” of affective lateralization, which posits that emotions such as empathy, attachment, aggression, and those linked to avoidance behavior are asymmetrically represented across the cerebral hemispheres.

Although the dominance of depressive symptoms in patients with right-hemispheric strokes remains a subject of ongoing debate, many sources in both the domestic and international literature associate post-stroke depression more frequently with left-hemispheric involvement.

The divergence in findings may be partially explained by the greater severity of

cognitive deficits in the right-hemisphere group, considering the shared neurobiological mechanisms underlying both cognitive dysfunction and depressive disorders. Moreover, the prominent roles of apathy and motivational deficits, frequently observed in this group, likely contribute to the higher incidence of depressive states.

The combination of executive dysfunction and elevated depressive symptoms may also underlie the tendency toward maladaptive coping behaviors in patients with right-hemispheric damage.

These findings underscore the importance of incorporating structured assessments for apathy, as well as more nuanced and multidimensional depression scales, into the clinical evaluation protocols for stroke survivors.

Conclusion

This study confirms that during the early recovery phase of ischemic stroke, patients with right- and left-hemispheric brain lesions exhibit distinct neuropsychological profiles in both qualitative and quantitative terms.

The predominance of cognitive and emotional disturbances in individuals with right-sided ischemic lesions, even in cases where motor impairments are relatively mild, highlights the necessity of early identification of neuropsychiatric and cognitive syndromes in this patient population.

The outcomes of the study support the development of personalized, integrative psychological rehabilitation protocols, which should be initiated early in the recovery timeline and tailored to reflect the lateralization of cerebral pathology.

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МОРФОЛОГИЧЕСКАЯ СТРУКТУРА ПОЧКИ ОРГАНИЗМА ЧЕЛОВЕКА (Обзор литературы)

МУХАММАДИЕВА Ф.Р.

Бухарский государственный медицинский институт

Аннотация: Почки выполняют ряд жизненно значимых функций, включая обеспечение гомеостатического равновесия, регуляцию системного артериального давления, поддержание осмотического баланса и кислотно-щелочного состояния организма. Исследование функционирования почек имеет принципиальное значение для углубления научных знаний и медицины, поскольку позволяет понять роль этого органа в физиологических и патологических процессах.

Почка представляет собой высокоспециализированный орган, который на протяжении всей жизни человека подвергается значительным функциональным нагрузкам и обеспечивает эффективное выведение продуктов обмена веществ из кровотока путём образования мочи. Благодаря своей многогранной физиологической активности, почка приобретает всё более важное значение в современных научных исследованиях и клинической практике.

Ключевые слово: почка, нефрон, проксимальный каналец, дистальный канальцев.

Аннотация: Буйраклар гомеостазни таъминлаш, қон босими, осмотик босимни сақлаш ва кислота-ишқор мувозанатини сақлашни ўз ичига олган бошқа ҳаётий функцияларни ҳам бажаради. Уларнинг натижаларини кўриб чиқиш, шубҳасиз, буйрак ва унинг фан учун аҳамияти ҳақидаги гоёларни ривожлантириш муҳимдир

Буйрак инсон умри давомида юқори даражадаги физиологик юкламага дуч келувчи ва сийдик ҳосил қилиши орқали қондан метаболик чиқиндиларни самарали филтрация қиладиган мураккаб тузилишли аъзо ҳисобланади. Ушбу органнинг кўп қиррали функциялари туфайли, у замонавий тадқиқотларда тобора муҳим ўрин тутмоқда.

Калит сўзлар: буйрак, нефрон, проксимал каналча, дистал каналча.

Abstract: The kidneys perform other vital functions, including maintaining homeostasis, regulating blood pressure, maintaining osmotic pressure, and balancing acid-base levels. Analyzing their results is undoubtedly important for developing ideas about the significance of the kidneys for science and medicine.

The kidney is a complex organ that, throughout a person's life, is subjected to high physiological loads and effectively filters metabolic waste from the blood through urine production. Due to its multifaceted functions, it is increasingly significant in modern research.

MUNDARIJA

1.	ГУЛАМОВ О.М., АХМЕДОВ Г.К., НАСРИДДИНОВ А.Н. ЭНДОСКОПИЧЕСКАЯ ДИАГНОСТИКА И КОМПЛЕКСНОЕ ЛАЗЕРНОЕ ЛЕЧЕНИЕ ПАТОЛОГИЧЕСКИХ ИЗМЕНЕНИЙ СЛИЗИСТОЙ ОБОЛОЧКИ ПИЩЕВОДА	4
2.	ORZIYEV Z. F. ТАКТИК БО‘Г‘INDAGI SHAXSIY TARKIBNI ISSIQ, CHO‘L VA TOG‘ SHAROITLARIDA SOG‘LIGINI SAQLASH JARAYONIDA TIBBIY MOL-MULK TA‘MINOTINI AHAMIYATI	8
3.	ГУЛАМОВ О.М., АЗИЗОВ Т.А., АХМЕДОВ Г.К., НАСРИДДИНОВ А.Н. КАМИНВАЗИВ ОПЕРАЦИЯЛАРИНИНГ КАРДИОЭЗОФАГЕАЛ СОҲА ЎСМАЛАРИДА ҚўЛЛАШ ХУСУСИЯТЛАРИ	13
4.	МУСТАНОВ А.Ю., ТУРСУНОВА Д. А., ХИДИРОВ Н. ҲАРБИЙ ХИЗМАТГА ЧАҚИРИЛАДИГАН ШАХСЛАРДАН НАЗОФАРИНГЕАЛ ТАШУВЧИЛИК ДАРАЖАСИНИ АНИҚЛАШ	17
5.	NISHONBOYEVA N.YU. BOLALARDA ATOPIC DERMATITNI YONDOSH KASALLIKLAR BILAN BIRGA KICHISHINI KLINIK XUSUSIYATLARI	23
6.	ТАДЖИЕВА У.Х., МИРАЛИМОВ М.М. АНАЛИЗ ПОВЕДЕНЧЕСКИХ ФАКТОРОВ, ОБУСЛОВЛЕННЫХ ПОТРЕБЛЕНИЕМ ТАБАКА И АЛКОГОЛЯ, В КОНТЕКСТЕ ОПРЕДЕЛЕНИЯ ПЕРСПЕКТИВНЫХ НАПРАВЛЕНИЙ РАЗВИТИЯ ОЗДОРОВИТЕЛЬНОГО ТУРИЗМА В РЕСПУБЛИКЕ УЗБЕКИСТАН	31
7.	ABDULLAYEVA N.N., BOTIROVA E.O., RUSTAMOV U.B. INSULTDAN KEYINGI NEYROKOGNITIV BUZILISHLARNING PAYDO BO‘LISH PROGNOZI	36
8.	НАБИЕВ А.М., БОЛТАЕВА С.А., ФАЙЗИЕВА С.Б., ГИПОТЕНЗИВНАЯ ЭФФЕКТИВНОСТЬ ПОВТОРНОГО ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ПЕРВИЧНОЙ ГЛАУКОМЫ	40
9.	КАДИРОВА З.Р. СОВРЕМЕННЫЕ ПРЕДСТАВЛЕНИЯ О КЕРАТИТЕ И ЕГО ВЛИЯНИИ НА ВОЕННОСЛУЖАЩИХ (ОБЗОР ЛИТЕРАТУРЫ)	42
10.	ESHKUVATOV K.R. NATO QO‘SHINLARI TIBBIY TA‘MINOTI: INNOVATSIYALAR, MUAMMOLAR VA ISTIQBOLLAR	47
11.	НАГАЕВ Ш.А. ВОПРОСЫ ГЕНЕТИКИ В ОПТИМИЗАЦИИ ПРОФИЛАКТИЧЕСКОЙ МЕДИЦИНЫ: НАУЧНЫЙ ОБЗОР	49
12.	JO‘RAYEV D.T., MUXAMEDOVA M.G. HARBIY GOSPITALLAR SHAROITIDA TIBBIY XIZMAT SIFATINI OSHIRISH	55
13.	MADMAROV M.M., SHARIPOVA G.I. PREVALENCE OF DENTAL DISEASES CAUSED BY THE INFLUENCE OF ENERGY DRINKS, SPECIFICITY OF DIAGNOSIS AND TREATMENT	58
14.	МАДМАРОВ М.М., ШАРИПОВА Г.И. ЭНЕРГЕТИК ИЧИМЛИКЛАРИНИНГ ТАЪСИРИ НАТИЖАСИДА ЮЗАГА КЕЛАДИГАН СТОМАТОЛОГИК КАСАЛЛИКЛАР	61

91.	МАМЕДОВА Г.Т. ТОКСИЧЕСКОЕ ДЕЙСТВИЕ УГАРНОГО ГАЗА НА ОРГАНИЗМ ЧЕЛОВЕКА И СОВРЕМЕННЫЕ ПОДХОДЫ К ОКАЗАНИЮ ПЕРВОЙ ПОМОЩИ	434
92.	ALFIYA MURADIMOVA RASHIDOVNA, MADZHIDOVA YOKUTHON NABIYEVNA THE IMPACT OF ISCHEMIC STROKE LATERALIZATION ON CLINICAL- NEUROLOGICAL AND COGNITIVE-EMOTIONAL MANIFESTATIONS	442
93.	МУХАММАДИЕВА Ф.Р. МОРФОЛОГИЧЕСКАЯ СТРУКТУРА ПОЧКИ ОРГАНИЗМА ЧЕЛОВЕКА (ОБЗОР ЛИТЕРАТУРЫ)	448
94.	MUSAYEVA G.I. YUQUMLI BO'LMAGAN KASALLIKLARNING RIVOJLANISHIGA OLIB KELUVCHI OMILLAR VA ULARNI NAZORAT QILISH YO'LLARI	455
95.	RUSTAMOVA N.B. 10 YOSHLI O'NAQAY VA CHAPAQAY BOLALARNING ANTROPOMETRIK KO'RSATKICHLARINING SOLISHTIRMA TAHLILI	461
96.	TOJIBOYEV TOJIBOY ALISHEROVICH, MUSASHAYXOV UMIDJON HUSANOVICH GIPERTENZIYA PATOGENEZIDA GENETIK BELGILARNING AHAMIYATI: MOLEKULAR-GENETIK BAHOLASH	463
97.	SAIDOVA SADOQAT YULDOSHOVNA DYNAMIC CHANGES IN EXOCARDIOGRAPHIC INDICATORS CONGENITAL HEART DEFECTS BY AGE	469
98.	YULDASHEV A.A. YUZ NERVI NEVROPATIYASI	474
99.	SOLIYEV ABBOSJON ALISHER O'G'LI TURG'UNLIKMI YOKI TARAQQIYOT? SIL KASALLIGIGA QARSHI KURASHNING STATISTIK TAHLILI. O'ZBEKISTON VA DUNYO BO'YICHA 15 YILLIK EPIDEMIOLOGIK KO'RSATKICHLAR	477
100.	АБДУЛЛАЕВ ГОЙИБШЕР АБДУЛХАМИДОВИЧ ДЕЙСТВИЕ РАСТИТЕЛЬНЫХ ПРЕПАРАТОВ НА ФАГОЦИТАРНАЯ АКТИВНОСТЬ НЕЙТРОФИЛОВ КРОВИ У ЛАБОРАТОРНЫХ ЖИВОТНЫХ	484
101.	TUXSANOVA N.E. GERBISIDLAR TA'SIRIDA INGICHKA ICHAK LIMFOID TUZILMALARI HUYAYRAVIY TARKIBINING O'ZGARISHLARI	488
102.	ХАКИМОВ Х. О., МУСАЕВА Г.И. ФАКТОРНЫЙ АНАЛИЗ РЕЗУЛЬТАТОВ ХИРУРГИЧЕСКОГО ЛЕЧЕНИЯ ГРЫЖ МЕЖПОЗВОНКОВЫХ ДИСКОВ, ПОЯСНИЧНО- КРЕСТЦОВОЙ ОБЛАСТИ У ВОЕННОСЛУЖАЩИХ	492
103.	ХОЖИЕВ ШАРИФ ШУКУРОВИЧ ОБЗОР ЛИТЕРАТУРЫ ПО ЭКСПЕРИМЕНТАЛЬНЫМ ИССЛЕДОВАНИЯМ ИЗМЕНЕНИЙ МОРФОФУНКЦИИ ЯИЧЕК	498
104.	ХАКИМОВ Х. О., МУСАЕВА Г.И. МЕТОД АНАЛИЗА ИЕРАРХИЙ В ОЦЕНКЕ КРИТЕРИЕВ И АЛЬТЕРНАТИВ МОДЕЛИ «ФАКТОРЫ РИСКА» ПРИ ГРЫЖАХ МЕЖПОЗВОНКОВЫХ ДИСКОВ ПОЯСНИЧНО-КРЕСТЦОВОЙ ОБЛАСТИ У ВОЕННОСЛУЖАЩИХ (СООБЩЕНИЕ I)	502