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ASSESSMENT OF DEPRESSION, FATIGUE, AND PSYCHOLOGICAL WELL-BEING IN PATIENTS AFTER STROKE: RESULTS OF A CROSS-SECTIONAL STUDY USING THE BECK, FAS, AND MHC-SF SCALES

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Abstract

Relevance: Stroke represents a substantial challenge in contemporary medicine. In addition to the neurological deficits arising from cerebrovascular damage, this condition significantly influences the psychological state and overall quality of life of affected individuals. The provision of psychological support and timely emotional intervention during the acute phase of a cerebral hemorrhage is essential for facilitating optimal motor recovery. The early identification and treatment of psycho-emotional disorders are particularly critical for enhancing recovery prospects following a stroke.

This study **aims** to evaluate the levels of depression, fatigue, and psychological well-being among stroke survivors utilizing validated assessment tools, specifically the Beck Depression Inventory (BDI), Fatigue Assessment Scale (FAS), and Mental Health Continuum-Short Form (MHC-SF).

Materials and Methods: Cross-sectional study conducted across two multidisciplinary hospitals in Aktobe from February to July 2024, the study encompassed 150 inpatients at designated stroke centers. Assessment of depression, fatigue, and psychological well-being was performed via the BDI, FAS, and MHC-SF scales.

Results: Among the 150 participants, a majority were female (58.7%). Ischemic strokes accounted for 55.3% of cases. Fatigue was reported by 54.7% of participants, with a mean FAS score of 35.68±9.28. The mean BDI score of 10.74±8.03 indicated the presence of mild depression, while the average MHC-SF score of 79.19±17.797 suggested a moderately high level of subjective psychological well-being.

Conclusion: The results underscore the necessity of adopting a comprehensive approach to post-stroke rehabilitation, which emphasizes not only the importance of physical recovery but also the reduction of fatigue, enhancement of psychological well-being, and timely diagnosis of depressive states. The emotional resources preserved by numerous patients can be utilized to elevate their quality of life and rehabilitation outcomes.

Keywords: *stroke, depression, fatigue, psychological well-being.*

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Резюме

ОЦЕНКА ВЫРАЖЕННОСТИ ДЕПРЕССИИ, УСТАЛОСТИ И УРОВНЯ ПСИХОЛОГИЧЕСКОГО БЛАГОПОЛУЧИЯ У ПАЦИЕНТОВ ПОСЛЕ ИНСУЛЬТА: РЕЗУЛЬТАТЫ ПОПЕРЕЧНОГО ИССЛЕДОВАНИЯ С ПРИМЕНЕНИЕМ ШКАЛ *BECK, FAS* И *MHC-SF*

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Актуальность. Инсульты являются одной из глобальных проблем современной медицины. Помимо нейрологических дефицитов, которые возникают в результате поражения головного мозга, данное заболевание существенно влияет на психологическое состояние и качество жизни пациентов. Психологическая поддержка и своевременная коррекция эмоционального фона при остром кровоизлиянии в мозг играют важную роль для успешного восстановления моторной активности. Для повышения шансов на благоприятное течение восстановления после инсульта особенно важно на ранних этапах выявлять и корректировать психоэмоциональные расстройства.

Цель: оценка уровня депрессии, усталости и психологического благополучия у пациентов, перенесших инсульт, с использованием валидированных шкал Beck Depression Inventory (BDI), Fatigue Assessment Scale (FAS) и Mental Health Continuum-Short Form (MHC-SF).

Материалы и методы. Поперечное исследование было инициировано в двух многопрофильных стационарах г. Актобе. С февраля 2024 года по июль 2024 года мы набирали участников, находящихся на стационарном лечении в инсультных центрах в этих клиниках. В исследовании приняли участие 150 человек. Проведены оценки усталости, депрессии и психологического благополучия с использованием различных инструментов – шкала депрессии Beck, FAS и MHC-SF.

Результаты. Мы включили в исследование 150 пациентов. Женщин было больше (58,7%, 95%ДИ 31,3- 46,9). Подавляющее большинство включенных в исследование (n=83; 55,3%) были с ишемическими поражениями. Усталость присутствовала у 82 участников исследования (54,7%). Среднее значение FAS 35,68±9,28 (ДИ 41,3-57,3). Шкала BDI (оценка депрессии)**:** среднее значение (10,74±8,03) указывает на легкий уровень депрессии в выборке. Шкала FAS (оценка усталости)**:** среднее значение (35,68±9,28) указывает на наличие усталости. По результатам опроса с использованием шкалы MHC-SF, среднее значение составило 79,19±17,797, что свидетельствует о умеренно высоком уровне субъективного психологического благополучия среди участников.

Заключение. Результаты исследования подчеркивают значимость многоаспектного подхода к восстановлению пациентов после инсульта, предполагающего не только физическую реабилитацию, но и внимание к снижению уровня усталости, укреплению психологического благополучия, а также своевременной диагностике депрессивных состояний. Эмоциональные ресурсы, сохраняющиеся у многих пациентов, могут быть использованы для улучшения их качества жизни и повышения эффективности реабилитационных программ.

Ключевые слова: *инсульт, депрессия, усталость, психологическое благополучие.*

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Түйіндеме

ИНСУЛЬТТАН КЕЙІНГІ НАУҚАСТАРДА ДЕПРЕССИЯНЫҢ, ШАРШАУДЫҢ ЖӘНЕ ПСИХОЛОГИЯЛЫҚ ӘЛ-АУҚАТ ДЕҢГЕЙІН АУЫРЛЫҒЫН БАҒАЛАУ: BECK, FAS ЖӘНЕ MHC-SF ШКАЛАЛАРЫН ҚОЛДАНА ОТЫРЫП, КӨЛДЕНЕҢ ЗЕРТТЕУ НӘТИЖЕЛЕРІ

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Кіріспе. Инсульт-қазіргі заманғы медицинаның жаһандық проблемаларының бірі. Мидың зақымдануы нәтижесінде пайда болатын неврологиялық тапшылықтардан басқа, бұл ауру пациенттердің психологиялық жағдайы мен өмір сапасына айтарлықтай әсер етеді. Жедел ми қан кетуіндегі психологиялық қолдау және эмоционалды фонды уақтылы түзету мотор белсенділігін сәтті қалпына келтіру үшін маңызды рөл атқарады. Инсульттан кейін қалпына келтірудің қолайлы ағымының мүмкіндігін арттыру үшін психоэмоционалды бұзылуларды ерте кезеңде анықтау және түзету өте маңызды.

Зерттеу мақсаты. Beck Depression Inventory (BDI), Fatigue Assessment Scale (FAS) және Mental Health Continuum-Short Form (MHC-SF) валидацияланған шкалаларын пайдалана отырып, инсультпен ауыратын науқастардағы депрессия, шаршау және психологиялық әл-ауқат деңгейін бағалау.

Материалдар мен тәсілдер. Көлденең зерттеу Ақтөбе қаласындағы екі көпсалалы стационарда басталды. 2024 жылдың ақпанынан 2024 жылдың шілдесіне дейін біз осы клиникалардағы инсульт орталықтарында стационарлық емдеуге қатысушыларды жинадық. Зерттеуге 150 адам қатысты. Шаршауды, депрессияны және психологиялық әл – ауқатты бағалау әртүрлі құралдарды-Beck, FAS және MHC-SF депрессия шкаласын қолдана отырып жүргізілді.

Нәтижелер. Біз зерттеуге 150 пациентті қостық. Әйелдер көп болды (58,7%, 95% CI 31,3 - 46,9). Зерттеуге қатысқандардың басым көпшілігі (N=83; 55,3%) ишемиялық зақымданулармен болды. Шаршау зерттеуге 82 қатысушыда болды (54,7%). FAS орташа мәні 35,68±9,28 (CI 41,3-57,3). BDI шкаласы (депрессияны бағалау): орташа мән (10,74±8,03) үлгідегі депрессияның жеңіл деңгейін көрсетеді. FAS шкаласы (шаршауды бағалау): орташа (35,68±9,28) шаршаудың болуын көрсетеді. MHC-SF шкаласын қолдана отырып жүргізілген сауалнама нәтижелері бойынша орташа көрсеткіш 79,19±17,797 құрады, бұл қатысушылар арасында субъективті психологиялық әл-ауқаттың орташа жоғары деңгейін көрсетеді.

Қорытынды: Зерттеу нәтижелері физикалық оңалтуды ғана емес, сонымен қатар шаршау деңгейін төмендетуге, психологиялық әл-ауқатты нығайтуға, сондай-ақ депрессиялық жағдайларды уақтылы диагностикалауға назар аударуды қамтитын инсульттан кейін пациенттерді қалпына келтіруге көп қырлы көзқарастың маңыздылығын көрсетеді. Көптеген пациенттерде сақталатын эмоционалды ресурстарды олардың өмір сүру сапасын жақсарту және оңалту бағдарламаларының тиімділігін арттыру үшін пайдалануға болады.

***Түйінді сөздер**: инсульт, депрессия, шаршау, психологиялық әл-ауқат.*

Дәйексөз үшін:

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Relevance

Strokes represent a significant global challenge within contemporary medicine, predominantly affecting individuals of advanced age, though there is an observable trend towards occurrence in younger populations. The World Health Organization identifies stroke as the second leading cause of death and disability worldwide, with a prevalence estimated at 6.67 per 100,000 individuals. In addition to the neurological deficits resulting from cerebral damage, stroke notably impacts the psychological well-being and quality of life of affected individuals. Neuropsychiatric changes frequently accompany stroke, leading to an increased likelihood of developing anxious-depressive syndromes, depressive states, hypochondriacal disorders, apathy, diminished self-esteem and outlook regarding the future, as well as social maladjustment. These factors substantially hinder the effective implementation of rehabilitation strategies. Timely psychological support and appropriate modification of the emotional landscape following acute cerebral hemorrhage are critical for the successful restoration of motor function. Furthermore, the active engagement of patients in their treatment process, coupled with a positive mindset, plays a crucial role in the adequate recovery of functional abilities and mitigation of residual effects of the illness. Post-stroke rehabilitation continues to be a primary objective in modern medical practice, as the ramifications of a stroke impose significant burdens not only on the individual experiencing emotional distress and suffering but also on society, due to diminished levels of social and professional integration. The efficacy of recovery is heavily influenced by the motivation of the patient, their family members, and healthcare professionals to restore previously lost functions. Nevertheless, the presence of depressive symptoms, which often co-occur with anxiety, phobic, and obsessive disorders, as well as reduced motivation, can severely hinder the attainment of favorable outcomes. Studies indicate that the prevalence of depressive disorders subsequent to a stroke ranges from 30% to 60%. Moreover, it has been documented that over 50% of patients experiencing an acute cerebrovascular event exhibit depressive disorders. Post-stroke depression typically manifests during the early recovery phase, although symptoms may arise as early as within the first week post-stroke, predominantly between days 7 and 10. This complication, frequently remaining undiagnosed, adversely impacts the recovery trajectory, potentially delaying the restoration of motor abilities, exacerbating cognitive impairments, increasing mortality risk, and significantly diminishing the patient's quality of life and willingness to engage in rehabilitation activities. To enhance the likelihood of a favorable recovery post-stroke, early identification and intervention for psycho-emotional disturbances are paramount. The effectiveness and pace of rehabilitation are greatly influenced by the prompt initiation of psychological support interventions, including addressing the manifestations of post-stroke depression. Evaluating psychological well-being and identifying contributors to deterioration in condition constitute critical phases in providing support to stroke survivors. Tools such as the Beck Depression Inventory (BDI), the Fatigue Assessment Scale (FAS), and the Mental Health Survey-Short Form (MHC-SF) are commonly employed to assess psychological and emotional status.

Objective of the study – to assess the levels of depression, fatigue, and psychological well-being in patients who have suffered a stroke, using validated scales: the Beck Depression Inventory (BDI), the Fatigue Assessment Scale (FAS), and the Mental Health Continuum-Short Form (MHC-SF).

Materials and Methods of the Study.

This study was initiated in two multidisciplinary hospitals in the city of Aktobe. From February 2024 to July 2024, we recruited participants undergoing inpatient treatment in the stroke centers of these clinics. The institutions where the research was conducted were informed about the progress of the research. There are no objections to the publication of the results in the open press. The study included 150 patients, among whom were 62 men (41.3%) and 88 women (58.7%), aged between 38 and 79 years. Participants were selected based on predefined inclusion and exclusion criteria. All participants were thoroughly informed about the objectives and conditions of the study and provided written consent to participate. After obtaining consent, demographic and clinical data were collected, including age, gender, education level, smoking and alcohol habits, presence of diabetes, heart diseases, and blood pressure level, stroke type, and lesion location. Data collection was conducted in a calm environment. After that, fatigue, depression, and psychological well-being

assessments were conducted using the Beck Depression Inventory, FAS, and MHC-SF scales.

The obtained data were processed using SPSS software version 26.0. Results are presented as means and standard deviations. The chi-squared test (χ^2) was used to analyze binary variables, and the Mann-Whitney non-parametric test was used for comparing categorical indicators. To assess correlations between depression levels, fatigue, and indicators of psychological well-being, Spearman's rank correlation coefficient was applied.

Study Design – cross-sectional study.

Study Participants

The study included patients aged 18 years and older who had experienced ischemic or hemorrhagic stroke (either first-time or recurrent), with cognitive impairments confirmed by MoCA scores ≤ 22.

Exclusion criteria included severe speech disorders (severe aphasia or dysarthria) or significant cognitive impairments hindering independent completion of diagnostic questionnaires. Also excluded were patients with unstable somatic conditions deemed clinically unsuitable for participation, individuals with previously undiagnosed psychiatric or severe neurological disorders, participants under 18 years of age, and patients who scored less than 23 points on the Mini Mental State Evaluation (MMSE) scale.

Instruments

All patients were surveyed using structured questionnaires. To identify patients with depression, the Beck Depression Inventory-II (BDI-II) was used. Fatigue was assessed using the Fatigue Assessment Scale (FAS), and psychological well-being was evaluated with the Mental Health Continuum-Short Form (MHC-SF). All measurements for each participant were completed on the same day.

Depression was assessed using the Beck Depression Inventory (BDI), which has been validated for stroke patients. The BDI is a self-report scale developed as a questionnaire to quantify the severity of depressive symptoms. It consists of 21 items covering symptoms such as sadness, pessimism, past failures, loss of pleasure, guilt, punishment feelings, self-dislike, self-criticism, suicidal thoughts, crying, irritability, loss of interest, indecisiveness, worthlessness, loss of energy, sleep changes, fatigue, appetite changes, weight loss, agitation, and loss of interest in sex. Each item is rated on a 4-point scale (0 = not at all; 3 = very severe). The total BDI score ranges from 0 to 63. A score of 14–19 indicates mild depression, 20–28 moderate depression, and 29–63 severe depression.

Fatigue was measured using the Fatigue Assessment Scale (FAS), a reliable and validated tool for assessing fatigue in stroke patients. The questionnaire includes 10 statements, five reflecting mental fatigue and five physical fatigue. Each item is rated on a 5-point scale from 1 (never) to 5 (always), indicating symptom frequency. Scores are summed to produce a total score; for items 4 and 10, responses are reverse-coded (from 5 to 1). The total score ranges from 10 to 50, with higher values indicating greater fatigue. A score of 22 or above is considered a diagnostic criterion for pathological fatigue syndrome.

The Mental Health Continuum-Short Form (MHC-SF) is one of the most widely recognized self-assessment tools internationally for comprehensively measuring psychological well-being. It covers three core aspects of mental health: emotional well-being, social well-being, and psychological well-being. Emotional well-being is assessed with 3 items, social with 5 items, and psychological with 6 items. The total score is interpreted to determine the level of subjective psychological well-being: 63 and above – very high, 49–62 – significantly above average, 36–48 – moderately above average, 23–35 – moderately below average, 9–22 – significantly below average, 8 and below – extremely low well-being.

The structure and methods of the study were approved by the Ethics Committee of the West Kazakhstan Medical University in 2017. (№ Протокола и дата)

Results

We included 150 patients in the study. The majority were women (58.7%, 95% CI: 31.3–46.9). Most of the participants (n = 83; 55.3%) had ischemic strokes. The remaining participants were diagnosed with hemorrhagic stroke (n = 14; 9.3%), transient ischemic attack (n = 52; 34.7%), and subarachnoid hemorrhage (n = 1; 0.7%). The stroke was the first occurrence in 127 cases (84.7%) and recurrent in 23 cases (15.3%).

Tables 1 and 2 present the demographic and clinical characteristics of the patients (mean age: 60.44 years, standard deviation: 9.42 years).

Fatigue was present in 82 study participants (54.7%). The mean FAS score was 35.68±9.28 (95% CI: 41.3–57.3).

Table 2 presents statistical data for the BDI (Beck Depression Inventory), FAS (Fatigue Assessment Scale), and MHC-SF (Mental Health Continuum-Short Form) scales.

- **BDI (Depression Assessment):** The mean score (10.74±8.03) indicates a mild level of depression in the sample.
- **FAS (Fatigue Assessment):** The mean score (35.68±9.28) confirms the presence of fatigue**.**
- **MHC-SF (Mental Health Assessment):** The average score was 79.19±17.797**,** reflecting a moderately high level of subjective psychological well-being among participants.

The data also indicate moderate expression of depressive symptoms and fatigue**,** while the overall psycho-emotional condition of the respondents can be characterized as stable, with a predominance of positive components of well-being**.** The wide range of BDI scores highlights the heterogeneity of depressive symptoms**,** emphasizing the need for an individualized approach to diagnosis and treatment**.** The presence of fatigue confirms its significance as a clinical symptom in stroke patients**.** The average level of psychological well-being indicates that many patients retain emotional resources**,** which can be utilized in rehabilitation programs.

Table 1.

Clinical and demographic characteristics of patients classified by the presence of post-stroke depression.

Characteristics	Patients with depression (BDI >9) (n = 75)	Patients without depression (BDI < 9) (n = 75)	Total (n =150)	p -value
Age	62.92 ± 8.61	59.89±9.59	60.44±9.42	0,001
BMI	28.54±5.73	28.21±5.52	28.38±5.61	0.708
glucose (mmol /l)	7.70±3.07	7.69±3.91	7.69±3.49	0.628
cholesterol (mmol /l)	5.47±1.46	5.27±1.32	5.37±1.39	0.265
HDL (mmol /l)	1.59±0.68	3.17±11.18	2.39±8.00	0.707
LDL (mmol /l)	3.10±1.28	4.67±10.13	3.92±7.38	0.505
triglycerides (mmol /l)	1.61±1.09	1.67±1.07	1.63±1.08	0.424
Creatinine (μmol)	80.42±24.37	84.13±25.95	82.21±25.11	0.346
SBP (mmHg) st)	149.08±23.21	154.60±25.87	151.80±24.63	0.201
DBP (mmHg) st)	87.63±10.94	89.59±12.46	88.60±11.72	0.544
SCF (ml/min/1.73 sq m) CKD - EPI	85.96±19.41	87.09±20.69	86.5±19.96	0.626
Floor	0.5±0.50	0.68±0.47	0.59±0.49	0.032
Social status	3.80±1.50	3.14±1.71	3.47±1.64	0.036
Education	4.92±0.99	5.11±0.80	5.01±0.90	0.529
Main diagnosis	1.75±0.93	1.86±0.97	1.81±0.95	0.717
Event	1.22±0.42	1.08±0.27	1.15±0.36	0.022
Localization	1.38±0.49	1.3±0.46	1.34±0.48	0,071
Smoking	0.54±0.79	0.64±0.79	0.59±0.79	0.627
Alcohol	0.34±0.64	0.41±0.70	0.37±0.67	0.832
Arterial hypertension	1.23±0.61	1.39±0.74	1.31±0.68	0.497
Diabetes mellitus	0.30±0.46	0.18±0.38	0.24±0.43	0.182

Table 2.

Characteristics of the results of the BDI, FAS, and MHC-SF scales of patients classified by the presence of post-stroke depression.

Characteristics	Patients with depression (BDI >9) (n =75)	Patients without depression (BDI < 9) (n = 75)	Total (n =150)	p -value
BDI scale	16.70±6.95	6.51±3.82	10.74±8.03	
FAS scale	39.89 ± 9.80	31.35 ± 6.29	35.68±9.28	0,000
MHC-SF scale	72.78 ± 16.61	85.77 ± 16.62	79.19±17.79	0,000

Table 3 presents the distribution of patients by degrees of depression, as assessed using the BDI (Beck Depression Inventory).

Table 3.

Descriptive statistics for the BDI depression scores.

Degree of depression	Abs.	%	DI
Absence of depressive symptoms	74	49.3	41.3-57.3
Mild depression	47	31.3	23.9-38.8
Moderate depression	10	6.7	2.7-10.7
Severe depression	16	10.7	5.7-15.6
Severe depression	3	2.0	-0.2-4.2

The analysis includes absolute numbers, percentages, and confidence intervals (CI). Absence of depressive symptoms: The largest proportion of patients (N = 74, 49.3%, CI: 41.3–57.3) showed no depressive symptoms. Nearly half of the study sample was in a normal emotional state, suggesting a low prevalence of depression in the group. Mild depression was observed in 31.3% (N = 47, CI: 23. Moderate depression was noted in 6.7% (N = 10, CI: 2.7–10.7). Marked depression was present in 10.7% (N = 16, CI: 5.7–15.6). Severe depression was identified in 2% (N = 3, CI: -0.2–4.2)] About half of the sample showed no symptoms of depression, while 50.7% of patients displayed various degrees of depression (ranging from mild to severe). Mild and marked depression comprised the majority among those with symptoms, highlighting the need for monitoring and early intervention.

Table 4 presenting descriptive statistics, shows the mean values (μ), standard deviations (SD), and confidence intervals (CI) for each item of the Beck Depression Inventory (BDI). The data allow for an assessment of the intensity of various aspects of depression in the studied group.

Items with the highest mean values:

- *Loss of interest in sex* (1.45±0.12, CI: 1.22–1.69) had the highest score, indicating the prevalence of this symptom among patients. This may be associated with physiological and psycho-emotional changes caused by stroke.
- *Fatigue* (0.77 ± 0.07, CI: 0.62–0.91) and *sleep disturbance* (0.72 ± 0.09, CI: 0.55–0.89) also showed high mean values, confirming their significance as components of depressive states in this patient group.
- *Irritability* (0.70 ± 0.06, CI: 0.57–0.83) and *loss of energy* (0.66 ± 0.08, CI: 0.51–0.81) were also notably pronounced among participants.

Items with low mean values:

• *Suicidal thoughts* (0.13±0.20, CI: 0.07–0.20) and *appetite changes* (0.21 ± 0.05, CI: 0.12–0.31) had the lowest scores, suggesting these aspects of depression were less prominent in this sample.

• *Past failures* (0.19 ± 0.05, CI: 0.09–0.29) and *self-dislike* (0.23 ± 0.05, CI: 0.12–0.33) were also relatively infrequent.

Table 4.

Descriptive statistics of the Beck Depression Inventory.

Points	μ	SD	DI
Sadness	0.53	0.06	0.42-0.64
Pessimism	0.62	0.05	0.51-0.73
Failures in the past	0.19	0.05	0.09-0.29
Loss of pleasure	0.41	0.06	0.30-0.52
Guilt	0.42	0.06	0.30-0.54
Feeling of Punishment	0.27	0.07	0.14-0.41
Self-loathing	0.23	0.05	0.12-0.33
Self-criticism	0.56	0.08	0.41-0.71
Thoughts of suicide	0.13	0.20	0.07-0.20
Cry	0.40	0.05	0.30-0.50
Irritability	0.70	0.06	0.57-0.83
Loss of interest	0.43	0.07	0.30-0.56
Indecision	0.68	0.09	0.50-0.86
Uselessness	0.40	0.07	0.27-0.53
Loss of energy	0.66	0.08	0.51-0.81
Change of sleep	0.72	0.09	0.55-0.89
Fatigue	0.77	0.07	0.62-0.91
Change in appetite	0.21	0.05	0.12-0.31
Weight loss	0.42	0.08	0.27-0.57
Anxiety	0.57	0.08	0.42-0.71
Loss of interest in sex	1.45	0.12	1.22-1.69

The high scores for fatigue, sleep changes, and energy loss confirm the importance of the physical aspects of depression in stroke patients.

Descriptive statistics of the Beck Depression Inventory

The physical and mental fatigue scores were compared using the Mann–Whitney U test in stroke patients with and without depressive symptoms. A p value < 0.05 was considered statistically significant. Stroke survivors with depressive symptoms had significantly higher FAS, physical, and mental scores than those without symptoms (Table 5).

Table 5.

Comparison of fatigue scores with and without depressive symptoms.

	Me (IQR)	U Mann-Whitney	Z	p
General With depression No depression	 39 (32-46) 30 (27-35)	1207,5	-6,040	0,001
Physical fatigue With depression No depression	 13 (11-16) 10 (9-12)	1504.5	-4,944	0,001
Mental fatigue With depression No depression	 13 (10-16) 10 (9-11)	1339,0	-5,587	0,001

Correlation analysis showed significant positive relationships between all three categories of well-being: emotional and social well-being: r = 0.415** (p < 0.01), emotional and psychological well-being: r = 0.461** (p < 0.01), social and psychological well-being: r = 0.576** (p < 0.01). These results confirm that higher levels of one type of well-being are associated with higher levels of other types of well-being. Thus, emotional, social and psychological well-being are interrelated aspects of overall well-being reflected in the MHC-SF (Table 6).

Table 6.

Descriptive statistics and Spearman's correlation coefficients subscales MHC – SF.

	Emotional well-being	Social welfare	Psychological well-being	MHC-SF total
M (SD)	14.09 (0.29)	13.92 (0.40)	23.17 (0.40)	51,80 (10,12)
Emotional well-being	-	0.415 **	0.461 **	
Social welfare	0.415 **	-	0.576 **	
Psychological well-being	0.461 **	0.576 **	-	

** - the correlation is significant at the 0.01 level

The relationships between the FAS fatigue scale, the MHC-SF psychological well-being scale and the Beck scale were assessed. The results are presented as correlation coefficients: the Beck scale and the psychological well-being scale (MHC-SF) correlate positively (r = 0.579**), indicating a significant relationship between low levels of depression (according to the Beck scale) and high levels of psychological well-being, the Beck scale and the FAS fatigue scale correlate negatively (r = -0.375**), indicating that higher levels of depression are associated with increased levels of fatigue, the FAS fatigue scale and the psychological well-being scale (MHC-SF) correlate negatively (r = -0.192**), indicating that high levels of fatigue are associated with lower levels of psychological well-being (Table 7).

Table 7.

Spearman Correlation Coefficients of Beck Depression Inventory, FAS Fatigue, and MHC - SF Psychological Well-Being.

	Fatigue Scale (FAS)	MHC - SF Psychological Well-Being Scale
Beck scale	0.579 **	-0.375 **
Fatigue Scale (FAS)		-0.192 **

** *Correlation is significant at the 0.01 level*

* *Correlation is significant at the 0.05 level*

Discussion

This study analyzed the clinical and demographic indicators of stroke survivors, with a focus on identifying the presence of post-stroke depression (PSD). The results revealed a statistically significant association between participants' age and the manifestation of depressive symptoms. The average age of patients with PSD was 62.92±8.61 years, which is higher than that of the group without signs of depression (59.89±9.59 years; p=0.001). This finding suggests that the likelihood of developing depression after a stroke increases with age, a trend supported by previously published studies. Specifically, according to literature, the average age of patients with PSD is about 68.3 years, while among those without depression it is around 63.1 years. Additional support for this trend comes from a study by *Monika Sadlonova and colleagues,* which found a higher frequency of depressive symptoms in individuals over the age of 60, aligning with the findings of this analysis.

When comparing clinical-laboratory parameters (including body mass index, blood glucose levels, total cholesterol, lipoproteins, triglycerides, creatinine, and glomerular filtration rate), no significant differences were found between patients with and without post-stroke depression. These data suggest that metabolic and vascular factors did not play a leading role in the development of depressive symptoms in the examined group. However, other studies point to the potential significance of certain biomarkers. For example, according to a meta-analysis by *Yiwen Wang and colleagues,* elevated blood glucose levels during the acute phase of stroke may increase the risk of developing PSD. A study led by *Yagiang Li* found an association between low levels of low-density lipoproteins (LDL) and the onset of PSD in cases of mild stroke, as well as between a high monocyte-to-high-density lipoprotein cholesterol (HDL) ratio and the risk of depression. Additionally, *Shiming Li and colleagues* demonstrated that a higher body mass index is associated with a greater risk of developing PSD (OR=2.46). However, these findings remain contradictory, as other studies have not confirmed a significant association between BMI and depressive symptoms after stroke. Regarding creatinine levels and glomerular filtration rate, the available literature provides very limited data on their connection to PSD, and no direct relationship has been established thus far.

Gender and social status demonstrated a significant impact on the likelihood of developing post-stroke depression (PSD). In particular, women were statistically more frequently represented among patients diagnosed with depression (p=0.032), which confirms data from previous studies highlighting the greater vulnerability of the female population to affective disorders. These findings align with the results of a meta-analysis conducted by Matthias Volz and co-authors. It was also found that patients with PSD had a lower social status compared to those without depressive symptoms (p=0.036). This suggests that socio-economic conditions may play a substantial role in the development of depressive manifestations in the post-stroke period. The influence of social status is likely mediated not only through profession or societal standing but also through factors such as the level of social support, economic stability, the severity of functional limitations, and the possibility of returning to customary social and occupational activities.

Fatigue was recorded in 54.7% of the examined patients, with a mean FAS score of 35.68±9.28, indicating the prevalence of this condition among the post-stroke population. Group comparisons revealed that patients with depressive symptoms exhibited a significantly higher level of fatigue (39.89±9.80) compared to those without depression (31.35±6.29; p<0.001), suggesting a close link between depression and subjectively experienced fatigue. PSD is one of the key factors contributing to pronounced fatigue following a stroke. Such patients experience fatigue more frequently and more intensely than those without depressive symptoms.

It should be noted that, despite their close association, **fatigue and depression can exist independently**: fatigue may persist even when depressive symptoms decrease. Moreover, a significant portion of patients without clinically apparent depression also experience fatigue at various points post-stroke — reported in 43% to 51% of cases according to the literature. In these patients, fatigue is associated with reduced physical activity, limited mobility, impaired daily functioning, and decreased overall quality of life. In PSD patients, fatigue is often accompanied by additional symptoms such as sleep disturbances, cognitive deficits (including slower information processing and memory impairment), and a greater degree of disability.

Given the clinical relevance of both the physical and psychological components of fatigue in patients diagnosed with depression, this symptom should be considered an important marker deserving special attention during screening, diagnosis, and in the planning of comprehensive PSD therapy.

Analysis of the data obtained using the MHC-SF scale showed that patients with pronounced depressive symptoms had a significantly lower level of psychological well-being (72.78±16.61) compared to participants without signs of depression (85.77±16.62; p < 0.001). These differences underscore the substantial impact of depression on the overall psycho-emotional state of stroke survivors. The results confirm that the presence of depressive symptoms in post-stroke patients is associated with a more marked decline in subjective well-being.

According to the literature, about one-third of stroke patients experience depression, which negatively affects all aspects of quality of life—physical health, emotional state, and social activity. Depression can also hinder successful rehabilitation and increase the risk of mortality. Research indicates that depression is one of the most significant predictors of reduced psychological well-being, as measured by tools like the MHC-SF and similar scales.

The conducted correlation analysis revealed significant associations between the severity of depression, levels of fatigue, and psychological well-being. A higher level of depressive symptoms was associated with a lower level of subjective well-being (r = 0.579; p < 0.01) and with more pronounced fatigue (r = -0.375; p < 0.01). These findings emphasize the need for a comprehensive approach to evaluating the psycho-emotional state of stroke patients, including assessments of depression, fatigue, and psychological well-being, since these factors are closely

interconnected and may mutually reinforce each other's negative effects.

The analysis of the severity of depressive symptoms showed that 50.7% of participants exhibited signs of depression of varying severity. The most common was mild depression, diagnosed in 31.3% of participants, highlighting the importance of early detection of emotional disturbances and timely initiation of psychotherapeutic support. According to previous studies, mild depression is found in approximately 13–15% of stroke patients, while severe forms occur in 17–18% of cases. Additionally, the sample showed a high prevalence of individual depression symptoms, such as fatigue, sleep disturbances, and reduced libido. These clinical manifestations deserve special attention as they can significantly reduce patients' quality of life.

Independent studies also confirm that the most typical depressive symptoms after a stroke include fatigue, insomnia, and loss of interest in sex. These conditions often persist over time and hinder successful recovery. Notably, decreased libido may remain under-recognized in clinical practice due to the sensitive nature of the topic and patients' reluctance to discuss sexual health with medical professionals.

In conclusion, the data indicate a high prevalence of depressive symptoms among stroke survivors and their association with factors such as age, gender, social environment, and fatigue levels. Incorporating a comprehensive assessment of depression and fatigue into standard rehabilitation care could contribute to a more complete recovery of the psycho-emotional state and positively impact the overall quality of life for these patients.

Conclusion

The results of the study highlight the importance of a multifaceted approach to stroke patient recovery, which should include not only physical rehabilitation but also efforts to reduce fatigue, enhance psychological well-being, and ensure timely diagnosis of depressive states. The emotional resources retained by many patients can be leveraged to improve their quality of life and increase the effectiveness of rehabilitation programs.

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