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“GENDER-RELATED FEATURES OF FUNCTIONAL RECOVERY AFTER LEFT AND RIGHT HEMISPHERE STROKES: CLINICAL AND REHABILITATION ANALYSIS”

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Abstract. This article examines the gender-related features of functional recovery processes following strokes in the left and right cerebral hemispheres from clinical and rehabilitation perspectives. The study analyzes the dynamics of recovery, severity of neurological symptoms, and differences in rehabilitation effectiveness between male and female patients after stroke. The importance of an individualized approach in clinical and rehabilitation practice is highlighted, and recommendations for developing rehabilitation programs that consider gender factors are provided. The article serves as a scientific and practical foundation aimed at improving recovery outcomes and enhancing health restoration measures after stroke.

***Keywords*:** stroke, left hemisphere, right hemisphere, functional recovery, gender differences, rehabilitation, neurological symptoms, individualized approach, clinical analysis, post-stroke recovery.

Introduction. Stroke is one of the leading neurological disorders worldwide that causes disability and mortality. This pathology mainly results from an acute disruption of cerebral blood flow, significantly reducing patients’ quality of life. The

post-stroke recovery process is complex and multi-staged, closely linked to the patient's functional status, psychological well-being, and ability to return to daily life activities.

In recent years, the importance of an individualized approach during post-stroke rehabilitation has increased. In addition to patients' age, stroke type and location, and pre-existing comorbidities, gender has been identified as a significant factor influencing recovery dynamics. Studies show that strokes occurring in the left and right cerebral hemispheres manifest differently in male and female bodies, with distinct behaviors and responses during the recovery process.

This article provides an in-depth clinical and rehabilitation analysis of gender-related features in post-stroke functional recovery. The aim of the study is to identify differences between men and women following left and right hemisphere strokes and to develop evidence-based recommendations to enhance rehabilitation effectiveness. This approach contributes to achieving better clinical outcomes when working with stroke patients in practical medicine.

Literature Review. In recent years, scientific research focusing on the clinical course of stroke and the post-stroke recovery process has been rapidly advancing. In particular, the gender-related aspects of functional recovery after stroke and how the localization of the stroke lesion (left or right hemisphere) affects the recovery process are considered important scientific and practical issues.

Both international and local literature have repeatedly confirmed that clinical symptoms differ depending on whether the stroke is located in the left or right cerebral hemisphere. For example, left hemisphere strokes mainly result in speech impairments (aphasia), loss of calculation and writing skills, whereas right hemisphere strokes are associated with disturbances in spatial orientation, attention, and visuomotor coordination (Kertesz, 1982; Heilman & Valenstein, 2011). These distinctions highlight the need for an individualized approach in choosing rehabilitation methods.

Regarding the role of gender in post-stroke recovery, several studies exist. Some authors emphasize that functional recovery after stroke occurs more slowly in women,

but their long-term outcomes tend to be more stable compared to men (Gall et al., 2012; Di Carlo et al., 2003). Although men tend to regain motor activity faster, they often face greater difficulties with psychological adjustment.

Moreover, the literature indicates that gender differences directly influence the effectiveness of post-stroke rehabilitation programs. Women's emotional responses and levels of motivation, and men's predominance in physical activity demands, need to be considered when developing rehabilitation strategies (Bushnell et al., 2014).

Although local research on this topic is relatively limited, practical observations conducted in some neurological clinics confirm the presence of gender-related differences and their impact on the rehabilitation process. This further underscores the necessity of investigating this issue with thorough scientific research.

Thus, a review of the existing literature shows that a comprehensive study of the roles of the left and right hemispheres, as well as gender-specific features of recovery, is crucial for improving clinical practice and rehabilitation outcomes. This article aims to fill this scientific gap and contribute to providing modern, individualized medical care based on evidence.

Results and Discussion. According to clinical observations and analyses conducted, the process of functional recovery following strokes in the left and right cerebral hemispheres is directly related to the patient's gender. The patients were divided into two groups — those with left hemisphere strokes and those with right hemisphere strokes — and within each group, male and female patients were analyzed separately.

The results showed that:

- Among patients with left hemisphere strokes, women experienced more pronounced speech impairments (aphasia), which required longer time for recovery. Men, however, demonstrated faster restoration of speech functions but exhibited slower psychological adjustment.

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- Among patients with right hemisphere strokes, men found it more difficult to overcome spatial perception, motor coordination, and attention deficits, whereas women showed better recovery in these areas but experienced more emotional instability and anxiety.

- During rehabilitation, women expressed significant needs for psychological and speech support, while physical therapy and exercises aimed at restoring independent mobility were more effective for men.

Overall, gender differences in post-stroke recovery should be considered a key factor in selecting individualized rehabilitation strategies.

These findings align with previous international research. For example, Bushnell et al. (2014) highlighted the complexity of psychological recovery in women after stroke, and Di Carlo (2003) noted the more stable long-term outcomes in women, which correspond with the results of this study.

The analysis shows that both the characteristics of functional impairments and the speed of recovery after left and right hemisphere strokes differ depending on gender. This necessitates incorporating the patient's gender when developing post-stroke treatment and rehabilitation programs. Replacing traditional "standard" rehabilitation approaches with gender-oriented, function-specific strategies can significantly accelerate the recovery process.

In conclusion, a thorough analysis of gender differences in recovery after left and right hemisphere strokes is an essential component of modern neurorehabilitation and enables achieving better clinical outcomes through individualized treatment approaches.

Methodology. This study employed clinical and rehabilitation analysis methods to identify gender-related features of functional recovery following left and right hemisphere strokes. The research included both retrospective and prospective stages.

1. Subjects and Participants: 100 stroke patients diagnosed in neurology departments were selected for the study. Of these, 50 patients had left hemisphere strokes and 50 had right hemisphere strokes. The number of males and females in each group was approximately equal.

2. Data Collection Methods: The clinical status, type of stroke, severity of symptoms, and functional state of patients were assessed using standard scales:

- NIHSS (National Institutes of Health Stroke Scale) — to determine stroke severity
- mRS (modified Rankin Scale) — to evaluate the degree of functional disability
- Barthel Index — to measure the level of independence in daily living activities

3. Rehabilitation Protocols: Patients underwent individualized rehabilitation programs including physiotherapy, speech therapy, psychological support, and social adaptation training. Each patient's age, gender, stroke location, and symptoms were taken into account.

4. Statistical and Analytical Methods: Data were analyzed using SPSS software. Gender-related differences were identified using Student's t-test, Mann-Whitney U test, and χ^2 tests. Longitudinal observations were conducted to demonstrate the dynamics of functional recovery.

5. Ethical Considerations: Informed consent was obtained from all participants, and confidentiality of data was ensured. The study was conducted in accordance with international and national ethical standards.

This methodology allowed a deep and systematic study of gender differences in post-stroke recovery and provided accurate and reliable results for clinical and rehabilitation practice application.

Table 1.

Parameters	Left Hemisphere Stroke	Right Hemisphere Stroke
	Men (n=25)	Women (n=25)
Speech impairment (aphasia) level	60% (moderate)	80% (severe)
Spatial perception impairment	20% (mild)	25% (mild)
Psychological state (anxiety level)	30% (moderate)	50% (high)
Average NIHSS score	8.2	9.5
Average mRS score	3.1	3.6
Barthel Index (independence)	65	55
Rehabilitation effectiveness (%)	75	65

- The degree of aphasia is more pronounced in women than men in left hemisphere stroke.
- Spatial perception impairments are more common in men with right hemisphere stroke.
- Women show higher levels of psychological stress and anxiety, which affects the rehabilitation process.
- Although Barthel Index scores are sometimes lower in women, independence is better restored in right hemisphere stroke.
- Rehabilitation effectiveness varies across genders and stroke locations; gender-tailored programs yield better results.

This table clearly and systematically shows gender and stroke location differences in the post-stroke recovery process. Based on these results, it is recommended to develop rehabilitation programs that are individualized and gender-specific.

Conclusion. The results of this study indicate that the functional recovery process following left and right hemisphere strokes is closely related to the patient's gender. In left hemisphere stroke, women experience more severe speech impairments and slower recovery, whereas men exhibit more difficulties in psychological adaptation. In right hemisphere stroke, men show more severe impairments in spatial perception and coordination, while women more frequently experience emotional instability and anxiety. Rehabilitation effectiveness also depends on gender, highlighting the necessity to develop individualized rehabilitation programs that consider gender-specific characteristics. Such an approach is crucial for accelerating recovery and improving patients' quality of life. Thus, implementing gender-adapted rehabilitation strategies in clinical practice is essential for achieving effective outcomes in neurorehabilitation.

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