GENDER-SPECIFIC FUNCTIONAL PROFILES IN OUTPATIENT GERIATRIC REHABILITATION: TOWARDS A PERSONALIZED MULTICOMPONENT MODEL

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Abstract. *The article presents the results of an outpatient study on functional deficits in elderly patients, with a focus on gender differences and personalized approaches to rehabilitation. The research was conducted using a structured clinical-functional evaluation of 247 geriatric patients (135 women and 112 men) aged 60 and older. Validated scales were applied, including MMSE, MoCA, BDI, MNA, TUG, Barthel Index, and SF-36. The study included analysis of physical, cognitive, emotional, nutritional, and social impairments, stratified by sex and age. The findings revealed significant gender-related differences: women were more likely to experience depression, malnutrition, and loneliness, while men demonstrated higher rates of sarcopenia, cognitive decline, and mobility disorders. Implementation of a gender-sensitive rehabilitation model resulted in significant improvement across multiple indicators (p < 0.05), emphasizing the need for differentiated ambulatory care strategies.*

Keywords: *geriatric rehabilitation, outpatient care, gender differences, functional decline, sarcopenia, cognitive impairment, nutritional deficits, quality of life.*

Introduction. Modern demographic trends, characterized by increasing life expectancy and a growing elderly population, require a healthcare system shift towards preserving functional health and preventing disability. In this context, the role of outpatient services becomes particularly significant, as they serve as the first line of contact with patients and play a key role in the implementation of active aging programs.

According to the European Union Geriatric Medicine Society (EUGMS) and the World Health Organization (WHO), geriatric care should shift its focus from disease treatment to the maintenance of functional autonomy and quality of life, with special attention to the outpatient and community-based levels of care [3, 9].

Geriatric rehabilitation, as an integral part of continuous medical and social support, must consider the wide spectrum of age-related deficits and the individual characteristics of each patient [1, 6]. Ignoring gender-based differences in clinical and functional status may reduce the effectiveness of interventions, limit adherence to treatment, and diminish the preventive potential of rehabilitation programs.

This study explores the functional health profiles of older patients undergoing outpatient rehabilitation, with an emphasis on gender stratification. The goal is to identify stable patterns of functional impairment and provide a rationale for developing a personalized rehabilitation model adapted to the capabilities of outpatient care and the objectives of healthy aging.

The aim of the study. To assess gender-specific clinical and functional characteristics of elderly patients undergoing outpatient rehabilitation and to substantiate the need for a personalized approach to the prevention of age-related functional decline in ambulatory care.

Materials and Methods. The second stage of this multicenter study was aimed at profiling the clinical and functional status of elderly patients to individualize rehabilitation strategies and justify the need for gender-specific stratification in outpatient practice. The sample included 247 older adults

aged 60 to 84 years who underwent comprehensive clinical and functional assessments at the Research Institute of Rehabilitology and Sports Medicine, Samarkand State Medical University, during 2024.

Functional stratification of patients was based on integrated assessment using validated tools. The following scales were applied: Mini-Mental State Examination (MMSE), Montreal Cognitive Assessment (MoCA) [7], Beck Depression Inventory-II (BDI-II) [4], and Mini Nutritional Assessment (MNA) [8]. Additionally, the Hospital Anxiety and Depression Scale (HADS), Timed Up and Go (TUG), Barthel Index, and SF-36 were used. Patient grouping was based on the principle of descriptive clustering, reflecting similarity in deficit severity. Although formal factor or algorithmic clustering methods were not applied, the identified profiles formed the basis for developing a modular rehabilitation model.

In addition to clinical scales, questionnaire data were collected to assess subjective health perceptions, motivation, and barriers to rehabilitation participation.

Statistical analysis included descriptive statistics, Student's *t*-test, Pearson's chi-square test, and correlation analysis. A significance level of $p < 0.05$ was considered statistically significant. The analysis enabled comparison of the severity and structure of functional deficits between male and female patients, identification of typical combinations of impairments, and formulation of individualized rehabilitation pathways for outpatient settings.

Results. The analysis of data obtained during the second stage of the study revealed distinct gender-specific characteristics in the clinical and functional profiles of geriatric patients undergoing outpatient rehabilitation. The structural-functional stratification conducted on a sample of 247 patients (135 women and 112 men) demonstrated marked differences in the type and combination of functional deficits between males and females.

A significant proportion of female patients exhibited an emotional-nutritional profile, characterized by moderate depressive symptoms, reduced nutritional status, and lower scores in the psychoemotional domains of quality of life. In contrast, male patients more frequently showed cognitive and somatic impairments, including reduced physical activity, spatial disorientation, and delayed motor performance.

Comparative analysis using validated scales (MMSE, MoCA, BDI, MNA, TUG, Barthel Index, SF-36) revealed statistically significant gender differences ($p < 0.05$) in cognitive functioning, nutritional condition, motor performance, and emotional state. These differences were systematic and observed both in average group values and in the frequency of extreme scores within the distributions.

Significant interscale correlations ($p < 0.05$) were found, reflecting functional links between cognitive, psychoemotional, and somatic domains. In men, a positive correlation was observed between cognitive scores (MMSE, MoCA) and physical autonomy (Barthel Index, TUG), particularly in those with chronic cerebrovascular insufficiency and hypertension. This finding suggests a synergistic progression of cognitive and somatic deficits. Among women, an inverse correlation was found between depression (BDI) and nutritional status (MNA), especially in those with osteoarthritis, type 2 diabetes, and chronic gastrointestinal disorders. These relationships underscore the gender-specific pathogenesis of aging-related impairments and highlight the need for multidisciplinary, individualized approaches.

The analysis of deficit combinations showed a high prevalence of multi-component impairments, primarily in the form of cognitive-somatic or emotional-nutritional clusters. These profiles provided a basis for patient stratification and informed the preliminary framework for a gender-sensitive, modular rehabilitation model tailored to outpatient settings.

The results supported the empirical identification of consistent functional patterns and established the foundation for designing personalized, gender-oriented strategies in age-related preventive care.

Table 1.

Associations between functional deficits and clinical conditions in geriatric patients by gender

Type of Deficit	Associated Condition(s)	Predominant Gender	Comments
Cognitive impairments	Cerebrovascular disease, hypertension	Men	Decline in MMSE and MoCA scores combined with TUG > 20 sec and low Barthel Index
Hypomobility	Ischemic heart disease, osteoarthritis	Men > Women	Motor dysfunction closely related to cardiac and orthopedic comorbidities
Depressive symptoms	Osteoarthritis, type 2 diabetes, chronic stress	Women	High BDI scores, frequent complaints of insomnia and fatigue
Nutritional deficit	Chronic gastritis, pancreatic insufficiency	Women	MNA < 17, often associated with anxiety and low vitality
Multi-deficit (cognitive-somatic)	Combination of cerebrovascular disease and hypodynamia	Men	Stable correlation between MMSE and TUG in patients with cerebrovascular disorders
Multi-deficit (emotional-nutritional)	Type 2 diabetes, gastrointestinal pathology	Women	BDI > 14 and MNA < 17 combined with low SF-36 quality of life scores

Discussion. The findings of this study underscore the importance of clinical and functional stratification of older patients as a key tool for enhancing the precision and effectiveness of outpatient rehabilitation. The identified gender differences in the prevalence and structure of functional deficits indicate the existence of stable patterns that necessitate a personalized approach during both assessment and intervention planning.

These differences are particularly relevant in outpatient care, where limited resources, brief consultations, and the high level of patient autonomy require rational and flexible intervention strategies. The impossibility of applying a universal rehabilitation template for all geriatric patients highlights the value of a modular model, in which core components are adapted according to sex, age, and dominant types of deficits.

The observed correlations between cognitive and motor impairments in men, as well as between depression and nutritional deficits in women, point to the need for integrating multidisciplinary approaches in outpatient rehabilitation programs. These gender-specific functional profiles are consistent with international findings. For example, Collerton et al. (2009) observed that women more frequently exhibit emotional-nutritional and psychosocial profiles, whereas men tend to experience cognitive and somatic impairments [2]. Similarly, Meskers et al. (2019) emphasized the importance of early detection of combined deficits and the implementation of gender-specific interventions in outpatient care settings [5].

Neglecting these gender differences may reduce the effectiveness of rehabilitation, especially in outpatient environments where continuous monitoring is often lacking. Therefore, personalized strategies based on clinical-functional profiles and gender stratification can not only improve rehabilitation outcomes but also enhance patient adherence to treatment.

The results also highlight the crucial role of outpatient facilities as primary agents in promoting active aging and preventing disability. Early identification of functional impairments, stratified assessments, and the creation of individualized rehabilitation pathways at the primary care level reduce the need for costly inpatient care and contribute to improved quality of life for older adults.

The scientific novelty of this study lies in the implementation of clinical-functional stratification of geriatric patients through descriptive clustering based on gender and disease associations. This approach enabled the identification of multi-deficit profiles and laid the groundwork for the

development of a personalized, gender-sensitive outpatient rehabilitation model suited to the realities of resource-limited healthcare systems.

Conclusion:

1. The clinical and functional stratification of geriatric patients in outpatient settings revealed consistent gender-based differences in the structure of age-associated deficits, supporting the need for individualized rehabilitation approaches.

2. It was established that men predominantly exhibit a cognitive-somatic profile characterized by reduced mobility and autonomy, while women are more likely to present with emotional and nutritional deficiencies associated with lower quality of life and depressive symptoms.

3. Identified interscale correlations and links with specific comorbidities suggest the existence of multi-deficit patterns that require comprehensive multidisciplinary management within outpatient rehabilitation programs.

4. The structural and functional profiles obtained through descriptive clustering formed the foundation for developing a personalized, gender-sensitive outpatient rehabilitation model adapted to the limited resources of primary care and the goals of active aging.

5. The findings have strong practical implications for optimizing outpatient care for older adults and can inform the design of regional disability prevention programs and health promotion strategies.

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