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Functional Recovery and Quality of Life Following Hip Fracture Rehabilitation in Elderly Individuals

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Abstract

Background: Hip fractures are a major cause of disability, loss of independence, and reduced quality of life among older adults. Effective rehabilitation plays a crucial role in restoring functional abilities and enhancing overall well-being following hip fracture surgery. Understanding the impact of rehabilitation on functional recovery and quality of life is essential for optimizing patient outcomes.

Objective: To evaluate the effectiveness of rehabilitation interventions on functional recovery and quality of life among elderly individuals following hip fracture.

Methods: A prospective comparative study was conducted among elderly individuals aged 65 years and above who underwent rehabilitation following hip fracture. Participants received a structured rehabilitation program consisting of mobility training, strengthening exercises, balance training, and activities of daily living (ADL) retraining. Functional recovery was assessed using standardized outcome measures such as the Functional Independence Measure (FIM) and Barthel Index, while quality of life was evaluated using the Short Form-36 (SF-36) questionnaire. Assessments were performed at baseline and after the rehabilitation period. Statistical analyses included descriptive statistics, paired t-tests, and independent t-tests, with significance set at $p < 0.05$.

Results: Participants demonstrated significant improvements in functional mobility, independence in daily activities, and overall quality of life following rehabilitation. Post-intervention scores showed notable gains in FIM and Barthel Index measurements, indicating enhanced functional recovery. Significant improvements were also observed across physical functioning, social participation, and emotional well-being domains of the SF-36. The findings suggest that comprehensive rehabilitation contributes substantially to both physical recovery and psychosocial outcomes in elderly individuals after hip fracture.

Conclusion: Structured rehabilitation programs are effective in promoting functional recovery and improving quality of life among elderly individuals following hip fracture. Early and multidisciplinary

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rehabilitation interventions can facilitate greater independence, reduce disability, and enhance overall well-being, emphasizing the importance of rehabilitation in geriatric orthopaedics care.

Keywords: Hip fracture, Rehabilitation, Functional recovery, Quality of life, Elderly individuals, Functional Independence Measure, Geriatric rehabilitation.

I. Introduction

Hip fracture is a major health concern among older adults and is recognized as one of the leading causes of disability, dependency, and mortality in the elderly population. With increasing life expectancy and the growing proportion of older individuals worldwide, the incidence of hip fractures has risen substantially over recent decades. These fractures are commonly associated with osteoporosis, age-related muscle weakness, impaired balance, visual deficits, and an increased risk of falls. As a result, hip fractures represent a significant challenge not only for affected individuals but also for healthcare systems and society as a whole (Cooper et al., 2011; Johnell & Kanis, 2006).

A hip fracture is generally defined as a break occurring in the proximal region of the femur and is most frequently classified as either femoral neck fractures or intertrochanteric fractures. In elderly individuals, low-energy trauma such as a simple fall from standing height is often sufficient to cause a fracture due to reduced bone mineral density and skeletal fragility. Hip fractures are associated with severe consequences, including prolonged hospitalization, reduced mobility, increased dependency, social isolation, and diminished quality of life. Furthermore, studies have reported that mortality rates within the first year following a hip fracture may range from 15% to 30%, highlighting the serious nature of this condition (Dyer et al., 2016).

The impact of a hip fracture extends beyond the immediate physical injury. Following a fracture, many elderly individuals experience a significant decline in their ability to perform activities of daily living (ADLs), including walking, dressing, bathing, toileting, and transferring independently. Functional limitations may persist for months or years after the injury, and some patients may never regain their pre-fracture level of independence. This loss of function often results in increased dependence on caregivers, institutionalization, and reduced participation in social and community activities (Magaziner et al., 2000).

Surgical intervention is considered the standard treatment for most hip fractures and aims to stabilize the fracture, reduce pain, and facilitate early mobilization. However, surgery alone is insufficient to ensure complete recovery. Successful rehabilitation is essential for restoring physical function, improving mobility, preventing complications, and enhancing overall quality of life. Rehabilitation programs typically begin shortly after surgery and involve a multidisciplinary team comprising physiotherapists, occupational therapists, nurses, physicians, and social workers. The collaborative approach ensures that physical, psychological, and social aspects of recovery are addressed comprehensively (Handoll et al., 2021).

Hip fracture rehabilitation focuses on several key components, including pain management, muscle strengthening, balance training, gait retraining, endurance exercises, and functional task practice. Physiotherapy interventions are primarily directed toward restoring mobility, improving lower-limb strength, and enhancing balance to reduce the risk of future falls. Occupational therapy plays a critical role in helping patients regain independence in daily activities and adapt to environmental challenges through assistive devices and home modifications. Together, these interventions contribute to improved functional outcomes and facilitate a return to independent living (Beaupre et al., 2013).

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Functional recovery is considered one of the most important indicators of successful rehabilitation following hip fracture. Functional recovery refers to the restoration of physical abilities necessary for independent living, including walking, transferring, self-care activities, and participation in social roles. Various outcome measures have been developed to assess functional recovery, including the Functional Independence Measure (FIM), Barthel Index, and Timed Up and Go Test (TUG). These tools provide objective information regarding a patient's ability to perform daily activities and monitor progress throughout the rehabilitation process (Tidermark et al., 2002).

Although functional recovery remains a primary goal, contemporary rehabilitation practice emphasizes the importance of quality of life as an equally significant outcome. Quality of life is a multidimensional construct encompassing physical health, emotional well-being, social functioning, psychological status, and perceived life satisfaction. Elderly individuals recovering from hip fractures frequently encounter emotional challenges such as anxiety, depression, fear of falling, and loss of confidence. These psychological factors may negatively influence rehabilitation outcomes and limit participation in social and recreational activities. Therefore, evaluating quality of life provides a more comprehensive understanding of the patient's overall recovery experience (Peeters et al., 2016).

Health-related quality of life (HRQoL) has gained increasing attention in geriatric rehabilitation research because it reflects the patient's subjective perception of health and well-being. Instruments such as the Short Form-36 (SF-36), EuroQol-5D (EQ-5D), and World Health Organization Quality of Life Scale (WHOQOL) are widely used to assess various dimensions of quality-of-life following hip fracture. Research has demonstrated that although some patients achieve satisfactory physical recovery, many continue to report lower quality of life compared to age-matched individuals without hip fractures. This finding underscores the need for rehabilitation programs that address not only physical impairments but also psychosocial and emotional concerns (Tidermark et al., 2002).

Early rehabilitation has been identified as a critical factor influencing recovery outcomes after hip fracture. Evidence suggests that initiating rehabilitation soon after surgery can reduce complications such as muscle atrophy, pressure ulcers, deep vein thrombosis, and respiratory infections. Early mobilization also promotes greater functional independence, shorter hospital stays, and improved quality of life. Furthermore, structured rehabilitation programs tailored to the individual's needs have been shown to facilitate more effective recovery compared to standard care approaches (Prestmo et al., 2015).

Several factors influence the extent of functional recovery following hip fracture rehabilitation. These include age, gender, pre-fracture functional status, cognitive function, nutritional status, comorbid medical conditions, social support, and rehabilitation intensity. Patients with better baseline health and stronger social support systems often demonstrate superior rehabilitation outcomes. Conversely, cognitive impairment, frailty, and multiple chronic diseases may hinder recovery and contribute to poorer functional and quality-of-life outcomes (Dyer et al., 2016).

Despite advances in surgical techniques and rehabilitation practices, hip fractures continue to impose a substantial burden on older adults. Many patients experience long-term disability, reduced independence, and persistent declines in quality of life. Consequently, there is a growing need to evaluate the effectiveness of rehabilitation interventions in promoting both functional recovery and overall well-being among elderly individuals. Understanding the relationship between rehabilitation and patient outcomes can help healthcare professionals develop evidence-based strategies to optimize recovery and enhance patient-centered care.

Given the increasing prevalence of hip fractures and their profound impact on physical, psychological, and social functioning, assessing rehabilitation outcomes remains a priority in geriatric healthcare. Therefore, the present study aims to evaluate functional recovery and quality of life following hip fracture

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rehabilitation in elderly individuals. The findings of this study may contribute to the development of more effective rehabilitation programs and support the implementation of comprehensive care strategies that improve independence, functional performance, and quality of life among older adults recovering from hip fractures.

II. Rationale of the Study

Hip fractures represent one of the most common and debilitating injuries among elderly individuals worldwide. Due to population aging and increased life expectancy, the incidence of hip fractures continues to rise, creating substantial challenges for healthcare systems, caregivers, and society. Although advances in surgical management have improved survival rates, many elderly individuals continue to experience long-term impairments in mobility, independence, and overall quality of life following a hip fracture.

The consequences of hip fractures extend beyond the immediate physical injury. Many patients experience difficulties in performing activities of daily living, reduced social participation, psychological distress, fear of falling, and increased dependence on caregivers. These limitations often contribute to a decline in health-related quality of life and may lead to institutionalization or long-term care placement. Therefore, successful rehabilitation is not only concerned with physical recovery but also with restoring an individual's ability to participate meaningfully in daily and social activities.

Rehabilitation programs incorporating physiotherapy, occupational therapy, balance training, gait retraining, and functional task-oriented interventions have been shown to improve mobility and independence. However, the degree to which these rehabilitation strategies influence overall quality of life remains variable across studies. While some individuals regain their pre-fracture functional status, others continue to experience persistent physical and psychosocial challenges despite receiving rehabilitation services.

Current literature has extensively documented the effectiveness of rehabilitation in improving physical function after hip fractures. Nevertheless, there remains a need for further investigation into the relationship between functional recovery and quality of life outcomes in elderly populations. Many studies primarily focus on mobility and functional independence while giving limited attention to patient-centred outcomes such as emotional well-being, social participation, and perceived quality of life.

Furthermore, differences in rehabilitation protocols, patient characteristics, comorbidities, and healthcare settings may influence recovery outcomes. Understanding these factors is essential for developing comprehensive rehabilitation programs that address both functional and psychosocial needs. Evaluating functional recovery alongside quality of life provides a more holistic assessment of rehabilitation effectiveness and may assist clinicians in designing individualized interventions.

The present study is therefore undertaken to examine the extent of functional recovery and quality of life following hip fracture rehabilitation in elderly individuals. The findings may contribute to evidence-based rehabilitation practices, improve patient outcomes, and support the development of multidisciplinary rehabilitation strategies aimed at enhancing independence and overall well-being among older adults recovering from hip fractures.

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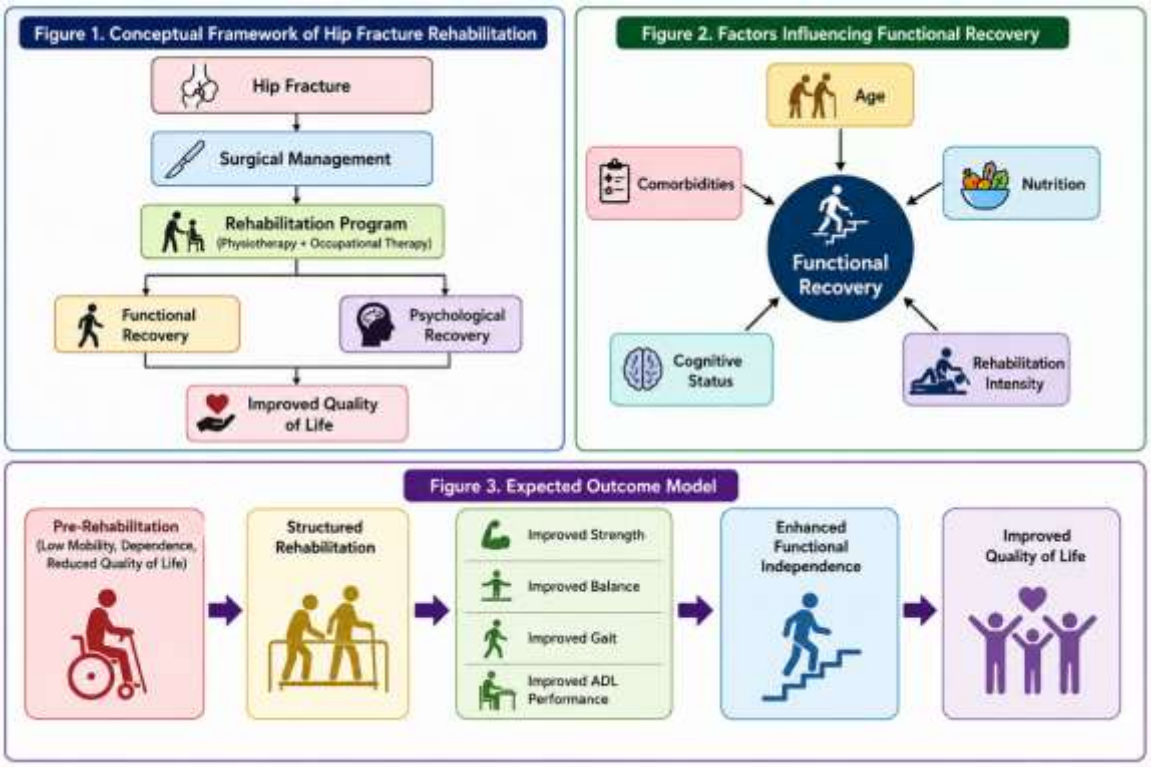

2.1 Significance of the Study

The significance of this study includes:

1. Providing evidence regarding the effectiveness of rehabilitation following hip fracture.
2. Evaluating improvements in functional independence among elderly individuals.
3. Assessing the impact of rehabilitation on quality-of-life outcomes.
4. Assisting healthcare professionals in developing patient-centred rehabilitation programs.

III. Aim and Objectives

To evaluate the effectiveness of hip fracture rehabilitation on functional recovery and quality of life among elderly individuals.

Objectives of the Study:

1. To assess the level of functional recovery among elderly individuals following hip fracture rehabilitation.
2. To evaluate the quality of life of elderly individuals after undergoing hip fracture rehabilitation.
3. To determine the relationship between functional recovery and quality of life following rehabilitation.

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IV. Research Methodology

The collected data were entered into a master data sheet and analysed using IBM SPSS Statistics Version 29.0. The following statistical procedures were performed:

1. Data Screening and Preparation

- Data were checked for completeness and accuracy.
- Missing values and outliers were identified and managed appropriately.
- Variables were coded and entered into SPSS for analysis.

2. Descriptive Statistics

- Demographic characteristics such as age, gender, fracture type, and comorbidities were summarized.
- Continuous variables were expressed as Mean ± Standard Deviation (SD).
- Categorical variables were presented as Frequencies (n) and Percentages (%).

3. Assessment of Normality

- The distribution of outcome measures was assessed using the Shapiro–Wilk test.
- Histograms and Q-Q plots were examined to verify data normality.

4. Baseline Analysis

- Baseline scores of all outcome measures were analysed to determine the initial functional status and quality of life of participants before rehabilitation.

5. Functional Recovery Analysis

The following outcome measures were used to evaluate functional recovery:

- Functional Independence Measure (FIM)
- Barthel Index (BI)
- Berg Balance Scale (BBS)
- Timed Up and Go Test (TUG)

Pre-rehabilitation and post-rehabilitation scores were compared using the Paired Samples t-test.

6. Quality of Life Analysis

- Quality of life was assessed using the Short Form-36 (SF-36).
- Changes in physical and mental health domains before and after rehabilitation were analysed using the Paired Samples t-test.

7. Correlation Analysis

- Pearson's Correlation Coefficient was used to determine the relationship between functional recovery and quality of life outcomes.
- Correlation strength was interpreted as weak, moderate, or strong.

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8. Effect Size Analysis

- Cohen's d was calculated to determine the magnitude of improvement following rehabilitation.
- Effect sizes were interpreted as:
  - Small Effect = 0.20
  - Moderate Effect = 0.50
  - Large Effect = 0.80

V. Data Analysis

Table 1.0: Demographic Characteristics of Participants

Variable	Category	Frequency (n)	Percentage (%)
Gender	Male	26	43.3
	Female	34	56.7
Age Group (Years)	65–74	29	48.3
	75–84	22	36.7
	≥85	9	15
Type of Fracture	Femoral Neck	35	58.3
	Intertrochanteric	25	41.7

The study included 60 elderly individuals with a mean age of 74.52 ± 6.81 years. Females constituted 56.7% of the sample, while femoral neck fractures accounted for 58.3% of all hip fractures.

Table 2.0: Comparison of Functional Recovery and Quality of Life Before and After Rehabilitation

Outcome Measure	Pre-Rehabilitation Mean ± SD	Post-Rehabilitatio Mean ± SD	t-value	p-value
FIM	72.41 ± 10.52	102.36 ± 9.87	16.84	<0.001*
Barthel Index	54.83 ± 12.41	82.67 ± 10.93	14.59	<0.001*
Berg Balance Scale	29.42 ± 6.88	43.51 ± 5.74	12.71	<0.001*
TUG (sec)	28.63 ± 5.91	18.27 ± 4.38	11.26	<0.001*
SF-36	46.18 ± 8.63	71.42 ± 7.91	15.33	<0.001*
***Significant at p < 0.05**				

Statistically significant improvements were observed across all outcome measures following rehabilitation ($p < 0.001$). Functional independence, activities of daily living, balance performance, and quality of life improved significantly, while mobility time measured by TUG decreased substantially, indicating enhanced mobility.

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Table 3.0: Correlation Between Functional Recovery and Quality of Life Following Rehabilitation

Variables	Correlation Coefficient (r)	p-value
FIM vs SF-36	0.781	<0.001*
Barthel Index vs SF-36	0.724	<0.001*
Berg Balance Scale vs SF-36	0.689	<0.001*
TUG vs SF-36	-0.641	<0.001*
***Significant at p < 0.05**		

A strong positive correlation was observed between functional recovery measures (FIM, Barthel Index, and BBS) and quality of life scores. A significant negative correlation was found between TUG and SF-36 scores, indicating that better mobility was associated with higher quality of life.

VI. Results

A total of 60 elderly participants with hip fractures were included in the study. The mean age of the participants was 74.52 ± 6.81 years. Among them, 34 (56.7%) were female and 26 (43.3%) were male. Regarding age distribution, 29 participants (48.3%) were aged between 65–74 years, 22 participants (36.7%) were between 75–84 years, and 9 participants (15.0%) were aged 85 years and above. With respect to fracture type, femoral neck fractures were the most common, accounting for 35 cases (58.3%), while intertrochanteric fractures were observed in 25 participants (41.7%).

Significant improvements were observed in all functional recovery and quality of life measures following rehabilitation. The Functional Independence Measure (FIM) score increased significantly from 72.41 ± 10.52 before rehabilitation to 102.36 ± 9.87 after rehabilitation ($t = 16.84$, $p < 0.001$). Similarly, the Barthel Index score improved from 54.83 ± 12.41 to 82.67 ± 10.93 ($t = 14.59$, $p < 0.001$), indicating enhanced independence in activities of daily living. Balance performance, assessed using the Berg Balance Scale (BBS), increased significantly from 29.42 ± 6.88 to 43.51 ± 5.74 ($t = 12.71$, $p < 0.001$). In contrast, the Timed Up and Go (TUG) test time decreased from 28.63 ± 5.91 seconds to 18.27 ± 4.38 seconds ($t = 11.26$, $p < 0.001$), reflecting improved mobility and gait performance. Quality of life, measured using the SF-36 questionnaire, also showed a substantial increase from 46.18 ± 8.63 to 71.42 ± 7.91 following rehabilitation ($t = 15.33$, $p < 0.001$). These findings demonstrate that the rehabilitation program was effective in improving functional independence, daily living activities, balance, mobility, and overall quality of life among elderly individuals recovering from hip fractures.

Correlation analysis revealed significant associations between functional recovery outcomes and quality of life following rehabilitation. A strong positive correlation was found between FIM and SF-36 scores ($r = 0.781$, $p < 0.001$), indicating that greater functional independence was associated with better quality of life. Similarly, the Barthel Index demonstrated a strong positive correlation with SF-36 scores ($r = 0.724$, $p < 0.001$), suggesting that improved performance in activities of daily living contributed to enhanced quality of life. The Berg Balance Scale also showed a significant positive correlation with SF-36 scores ($r = 0.689$, $p < 0.001$), indicating that better balance performance was related to higher quality of life. Conversely, TUG scores exhibited a significant negative correlation with SF-36 scores ($r = -0.641$, $p < 0.001$), suggesting that shorter mobility times and better physical mobility were associated with

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improved quality of life. Overall, the findings indicate that functional recovery is strongly linked to quality-of-life outcomes in elderly individuals following hip fracture rehabilitation.

VII. Conclusion

This study demonstrated that rehabilitation significantly improved functional recovery and quality of life among elderly individuals following hip fracture. Significant gains were observed in functional independence, activities of daily living, balance, and mobility, along with substantial improvements in SF-36 quality of life scores ($p < 0.001$). Furthermore, strong correlations between functional recovery measures and quality of life indicate that better physical functioning is associated with enhanced overall well-being. These findings highlight the importance of structured rehabilitation programs in promoting recovery and improving long-term outcomes after hip fracture.

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