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The Influence of Aging on Bone Health: Analyzing the Effects of Sarcopenia on Orthopedic Rehabilitation

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Abstract
Sarcopenia, a progressive loss of skeletal muscle mass and function, poses a critical challenge in geriatric orthopedic care, particularly in the context of postoperative rehabilitation. The research examined how sarcopenia affects recovery results in elderly patients who receive orthopedic surgery. The research adopted a prospective cohort approach to enroll elderly patients whose surgical procedure was either elective or emergency-based orthopedic surgery. The EWGSOP2 criteria established the diagnosis of sarcopenia through assessments of muscle strength together with muscle mass and physical performance measurements. The study analyzed postoperative outcomes between sarcopenic and non-sarcopenic patients by evaluating independent ambulation duration and pain scores together with functional mobility and hospital stay length and complication rates. The study findings revealed that patients with sarcopenia required longer time to achieve independent ambulation (median 11 vs. 7 days, $p < 0.001$), suffered elevated pain measurements at day 3 and discharge and exhibited worse functional outcomes together with higher rates of complications and 30-day readmissions. Sarcopenia proved itself as a stand-alone factor that predicts unfavorable rehabilitation results following age, sex, BMI and comorbidities adjustments in multivariable regression. Preoperative screening of sarcopenia shows critical medical value while highlighting that targeted preoperative treatment plans might elevate rehabilitation successes with lessened adverse occurrences. Sarcopenia evaluation within orthopedic care trajectories helps identify patient risk better and creates specific rehabilitation plans which results in improved surgical results for elderly patients.

Keywords: Sarcopenia, Orthopedic Rehabilitation, Muscle Function, Aging, Functional Recovery

1. Introduction

The global demographic shift toward an aging population has brought age-related musculoskeletal decline to the forefront of clinical and research agendas. Among the most pressing concerns in this domain is sarcopenia, a progressive and generalized skeletal muscle disorder characterized by loss of muscle mass, strength, and function (Cruz-Jentoft & Sayer, 2019). Sarcopenia is now widely recognized as a key contributor to frailty, disability, hospitalization, and mortality in older adults, exerting a profound impact on quality of life and health system burden (Papadopoulou, 2020). While aging-related changes in musculoskeletal health have long been considered inevitable, the emergence of sarcopenia as a modifiable and clinically actionable syndrome has generated substantial interest in its implications for rehabilitation and orthopedic recovery.

Sarcopenia is intricately linked with other age-associated conditions, particularly osteoporosis, and together they constitute the emerging concept of osteosarcopenia condition in which bone and muscle deterioration co-exist, compounding the risk of falls, fractures, and impaired functional recovery (Hirschfeld, Kinsella, & Duque, 2017). The close physiological and molecular crosstalk between bone and muscle—both of which share endocrine and mechanical signaling pathways—suggests that a decline in one tissue invariably affects the other (Fielding et al., 2011). Consequently, patients with sarcopenia are not only at elevated risk of sustaining orthopedic injuries but also demonstrate inferior recovery following surgical interventions, including joint arthroplasty and fracture fixation.

Despite its prevalence and clinical significance, sarcopenia remains underdiagnosed in routine practice (Fielding et al., 2011; Bauer et al., 2013). This diagnostic gap is partially attributable to historical inconsistencies in definitions and measurement tools. Early criteria for sarcopenia focused solely on muscle mass, whereas recent guidelines—such as those proposed by the European Working Group on Sarcopenia in Older People (EWGSOP) emphasize a multidimensional approach, incorporating assessments of muscle strength, physical performance, and muscle quantity (Cruz-Jentoft et al., 2010; Beaudart et al., 2019). Instruments such as handgrip dynamometry, the

Short Physical Performance Battery (SPPB), and dual-energy X-ray absorptiometry (DEXA) are now recommended for sarcopenia screening and diagnosis. Standardizing these methods is essential to identifying at-risk individuals preoperatively and tailoring rehabilitation interventions accordingly.

From a rehabilitation standpoint, the presence of sarcopenia presents unique challenges. Evidence suggests that older adults with reduced muscle strength and endurance exhibit slower postoperative recovery, longer hospital stays, greater dependence on assistive devices, and a higher likelihood of institutional discharge (Mitchell et al., 2012). Sarcopenia has also been associated with impaired pain modulation and suboptimal participation in physical therapy, further compounding delays in functional restoration (Landi et al., 2012). In orthopedic settings, this is particularly concerning, as timely mobilization and strength recovery are pivotal to avoiding complications such as thromboembolism, infections, and loss of independence.

The burden of sarcopenia is not limited to physical function alone. Studies have shown that muscle degradation is often accompanied by metabolic dysfunction, increased fat infiltration in muscle tissue, and systemic inflammation—factors that may negatively influence bone healing and response to surgical stress (Marzetti et al., 2017). Moreover, sarcopenia is more prevalent in individuals with poor nutritional status, low physical activity levels, and chronic disease comorbidities, all of which further impede rehabilitation outcomes (Papadopoulou, 2020). These multidimensional challenges call for integrative, multidisciplinary approaches to orthopedic care in the elderly, encompassing nutritional support, resistance training, and early mobilization protocols tailored to the sarcopenic phenotype.

Given the significant clinical and economic implications of sarcopenia, major health organizations have called for urgent action. The Society on Sarcopenia, Cachexia and Wasting Disorders (SCWD) advocates for widespread screening and individualized management plans, particularly in surgical and rehabilitation settings (Bauer et al., 2013). Similarly, the European Society for Clinical and Economic Aspects of Osteoporosis and Osteoarthritis (ESCEO) endorses the routine evaluation of muscle function in older adults as a core component of geriatric care (Beaudart et al., 2019).

Despite this growing body of evidence, gaps remain in understanding the precise impact of sarcopenia on postoperative orthopedic rehabilitation. Few studies have systematically evaluated how preoperative sarcopenia status influences recovery trajectories, functional benchmarks, and complication rates following orthopedic surgery. Moreover, while the literature confirms the association between sarcopenia and poor outcomes, there is limited consensus on optimal intervention strategies within the perioperative period.

Therefore, the present study aims to bridge this gap by analyzing the influence of sarcopenia on bone health and orthopedic rehabilitation outcomes in elderly patients. Using a standardized diagnostic framework and robust outcome measures, this research investigates whether sarcopenic patients experience significantly different trajectories in terms of pain resolution, mobility recovery, and hospital discharge metrics when compared to non-sarcopenic counterparts. The overarching goal is to provide evidence that informs preoperative risk stratification, postoperative planning, and resource allocation in orthopedic care for the aging population.

2. Literature Review

2.1 Sarcopenia: Epidemiology and Clinical Relevance

Skeletal muscle mass and strength decline progressively in patients with sarcopenia which has become the primary subject of research in age-related musculoskeletal decline studies. The condition affects a substantial portion of the population since it exists in 5–13% of people between 60–70 years old and reaches 50% in those older than 80 years (Morley, Anker, & von Haehling, 2014). Sarcopenia produces clinical effects that go beyond muscle problems because it increases the risk of falls and frailty and hospitalization and loss of independence and death. The medical community now identifies sarcopenia as an essential part of the geriatric syndrome triad together with osteoporosis and frailty because of its connections with metabolic and inflammatory and biomechanical processes (Rolland et al., 2008). Sarcopenia develops from multiple causes that include neuromuscular degeneration and chronic inflammation together with hormonal changes and nutritional deficits and physical inactivity (Tieland, Trouwborst, & Clark, 2018). According to Walston (2012) anabolic resistance functions as a primary factor that drives the advancement of sarcopenia because it reduces muscle protein synthesis in older adults. Moreover, age-related decline in satellite cell function and mitochondrial efficiency exacerbates muscle deterioration, particularly under catabolic stress conditions such as surgery, immobilization, or systemic illness.

2.2 Sarcopenia and Musculoskeletal Comorbidities

Sarcopenia develops as an independent condition only exceptionally. Multiple research studies demonstrate that sarcopenia co-occurs with osteoarthritis and osteoporosis which results in worsened mobility and postural instability. The

severity of knee osteoarthritis shows a direct relationship with muscle weakness according to De Zwart (2022) who found that weak quadriceps reduce joint loading mechanics and rehabilitation potential. Balogun (2018) found that people with sarcopenia face increased risk of developing secondary joint problems because their altered gait and reduced shock absorption and delayed neuromuscular response times.

The relationship between these factors becomes more complex because of metabolic risk elements. The ROAD study conducted by Yoshimura et al. (2011) demonstrated that knee osteoarthritis develops strongly when metabolic abnormalities including obesity, dyslipidemia, hypertension and glucose intolerance cluster together. These conditions help create sarcopenic obesity which brings difficulties in rehabilitation because it combines muscle atrophy with fat accumulation and causes systemic inflammation and biomechanical imbalance.

2.3 Biological Mechanisms and Emerging Perspectives

Modern molecular biology has revealed that sarcopenia exists beyond mechanical tissue decline and degeneration to become a complete systemic and metabolically active cellular process. Multiple studies have shown that Inflammatory markers including IL-6, TNF-α and CRP directly associate with muscle wasting while simultaneously contributing to reduced regeneration ability (Rolland et al., 2008; Tieland et al., 2018). The pathophysiological connection between sarcopenia and osteoporosis emerges from "inflammaging" which causes persistent low-grade inflammation that damages both muscle and bone tissue.

The gut–muscle axis represents a new proposed mechanism which influences musculoskeletal health. The research conducted by Yang et al. (2025) used Mendelian randomization to show that gut microbiota dysbiosis causes systemic changes in inflammation levels during arthritis development. These research findings primarily focused on inflammatory bowel disease-related arthritis but create new possibilities to study how microbiota-mediated immune regulation affects sarcopenia and orthopedic results.

2.4 Sarcopenia and Orthopedic Rehabilitation

Sarcopenia impacts the entire recovery process for patients undergoing orthopedic surgical procedures including joint replacements or fracture repair. The existing deficit of muscle mass and strength at the beginning leads to increases in both ambulatory independence time and rehabilitation delays and boosts assistive device dependence (Tieland et al., 2018). The neuromuscular control problems along with reduced endurance and functional mobility of sarcopenic patients result in limited participation in physiotherapy programs and higher risks of secondary complications.

Sarcopenia functions as a proven indicator which leads to poor rehabilitation results in both hospital-based and outpatient care. According to Walston (2012) older adults who have lower muscle strength experience reduced physiological capabilities which increases their risk of developing postoperative delirium and infections and extended periods of immobility. Early patient movement plays an essential role in fracture management since it helps stop the development of thromboembolism and deconditioning.

2.5 Lifestyle and Nutritional Interventions

Sarcopenia treatment and prevention strategies primarily incorporate exercise programs together with nutritional interventions and medication-based support. Scientific research shows that resistance exercise performed regularly together with high-protein diets helps prevent muscle deterioration and enhances physical performance. The research by Zhu and Prince (2015) highlights the significance of lifestyle changes that combine physical exercise with smoking cessation and proper vitamin D and calcium intake for minimizing osteoporosis risk in patients who also have sarcopenia. Experimental research by Zhu et al. (2008) illustrated that vitamin D deficiency in elderly women could be addressed through calcium and vitamin D supplements which enhanced bone health and decreased bone remodeling and manifested as muscle function improvement.

The medical field has started to show interest in nutritional strategies that address anabolic resistance. The author Balogun (2018) suggested using leucine-rich amino acids along with omega-3 fatty acids for sarcopenic patients to boost their muscle protein synthesis capacity while decreasing their overall inflammation. Orthopedic professionals now combine these methods for preoperative optimization programs since they aim to enhance physical resistance before surgical procedures especially with vulnerable orthopedic patients.

3. Methodology

3.1 Study Design

The research adopted a prospective cohort design to examine how sarcopenia affects postoperative rehabilitation results in elderly patients who receive orthopaedic surgery. The research spanned twelve months from January to December 2023 at a tertiary care academic hospital which operated an orthopaedic and rehabilitation department specifically. The research enrolled patients before surgery then divided them into two groups according to their sarcopenia status. The main purpose of this research was to evaluate how sarcopenia affects the duration of postoperative independent ambulation

but it also measured postoperative pain levels and hospital stay duration and complications and short-term functional recovery.

3.2 Study Population

The research included patients who received elective or emergency orthopaedic surgery for hip fracture repair and total hip arthroplasty and total knee replacement procedures among those aged 60 years and older. The study recruited participants from the orthopaedic surgery inpatient service after medical screening and written consent approval. Several patient safety measures were implemented for maintaining data consistency before patient recruitment. The study excluded patients who scored below 24 on the Mini-Mental State Examination for advanced cognitive impairment as well as those with neuromuscular disorders including Parkinson's disease or multiple sclerosis and individuals with terminal illness or life expectancy less than six months and patients who had prior major orthopaedic procedures on the same limb or joint. The study excluded patients who could not perform sarcopenia assessments because they had contraindications to imaging or physical testing. The research included 160 participants who were divided into 72 patients with sarcopenia and 88 patients without sarcopenia after applying the study criteria.

3.3 Diagnosis of Sarcopenia

The European Working Group on Sarcopenia in Older People 2 (EWGSOP2) provided the diagnostic criteria for sarcopenia assessment. The diagnostic process required evaluation of muscle strength together with muscle mass and physical performance measurements. Handgrip dynamometry tests determined muscle strength by using 27 kg for men and 16 kg for women as diagnostic thresholds for reduced strength. Dual-energy X-ray absorptiometry (DEXA) technology measured muscle mass by evaluating appendicular skeletal muscle indices because diagnostic cutoffs used 7.0 kg/m^2 in men and 5.5 kg/m^2 in women. The Short Physical Performance Battery (SPPB) evaluated physical performance through scoring and a total score below 8 indicated poor functional performance. The research classified participants with both low strength and low muscle mass as having confirmed sarcopenia yet those with additional low physical performance received a severe sarcopenia diagnosis. The study included patients who had either confirmed or severe cases of sarcopenia.

3.4 Rehabilitation Protocol

The rehabilitation protocol followed a standardised approach according to institutional guidelines for geriatric orthopaedic care for all patients. The rehabilitation programme started within 48 hours after surgery only when patients met both medical and surgical stability criteria. The physical therapy sessions ran twice per day to perform progressive resistance exercises and gait training and balance improvement routines and range-of-motion exercises. The therapy intensity received modifications according to how patients responded to treatment and how their clinical condition improved. Healthcare professionals performed nutritional evaluations for every patient within 48 hours of their hospital admission then delivered specialized nutrition support to patients who showed insufficient protein consumption (less than 1.2 g/kg/day) through high-protein oral supplements. Patients received pain management through multiple methods of analgesia which included paracetamol and NSAIDs and opioids as required to maximize their ability to do physiotherapy.

3.5 Outcome Measures

The main outcome of this research examined the duration until patients achieved independent walking ability after surgery. The physiotherapists who were licenced documented and verified this achievement. The study evaluated postoperative pain through Visual Analogue Scale (VAS) assessments at day 3, day 7 and discharge time points while assessing functional recovery using Short Physical Performance Battery (SPPB) and 6-Minute Walk Test (6MWT) at discharge and one-month follow-up. Hospital stay duration was also measured. Secondary results evaluated both postoperative adverse events such as surgical site infections and thrombus-forming complications and wound healing issues and 30-day hospital return rates. Standardized tools and documentation templates were used to record all gathered results.

3.6 Data Collection and Management

The study collected baseline patient information from electronic medical records which included age, sex, body mass index (BMI) and preoperative Charlson Comorbidity Index scores and functional status and nutritional scores. These data points were verified through patient interviews. The assessment of sarcopenia took place within a 48-hour period before surgical procedures. The postoperative and rehabilitation data collection process occurred daily throughout hospitalisation by research assistants who were unaware of patient group assignments. Outpatient visits took place one month after hospital discharge for conducting the follow-up assessments. Data for all patients underwent de-identification through unique identification numbers while these data stayed protected under a password-secured research database which followed the institutional review board (IRB) protocol.

3.7 Statistical Analysis

The researchers conducted all statistical analyses through IBM SPSS Statistics version 27 and R version 4.3.1. The baseline characteristics were summarised through descriptive statistics while continuous variables appeared as mean ± standard deviation (SD) or median with interquartile range (IQR) based on their distribution patterns. The researchers displayed categorical variables through frequencies and percentages. The independent-sample t-test analysed normally distributed continuous variables while Mann–Whitney U tests analysed non-parametric data. The analysis used Chi-square tests together with Fisher's exact tests for categorical data evaluation.

Analysis of relationships between sarcopenia and outcomes required multivariable linear regression for continuous outcomes and logistic regression for binary outcomes with independent variables including age, sex and BMI and comorbidity burden. The Cox proportional hazards model served to analyse the time to independent ambulation as a time-to-event outcome. The research employed two-tailed statistical tests with a p-value threshold of less than 0.05 to determine statistical significance. Model diagnostics confirmed the validity of assumptions, which included normality tests and checks for homoscedasticity and multicollinearity.

4. Results

4.1 Baseline Characteristics of Study Population

The research included 160 patients in its final analysis. The analysis included 160 patients, where 72 individuals (45%) met the EWGSOP2 criteria for sarcopenia diagnosis and 88 patients (55%) served as non-sarcopenic controls. The entire study population averaged 72.3 ± 6.1 years in age, yet the sarcopenic participants (74.2 ± 5.7 years) demonstrated significantly higher age than non-sarcopenic participants (70.9 ± 5.9 years; $p < 0.001$). The patients with sarcopenia presented with more comorbidities (Charlson Comorbidity Index: 5.4 ± 1.3 vs. 3.8 ± 1.2; $p < 0.001$) and lower baseline BMI (Table 1).

Table 1. Baseline Characteristics of Study Participants

Variable	Sarcopenic (n = 72)	Non-Sarcopenic (n = 88)	p-value
Age (years)	74.2 ± 5.7	70.9 ± 5.9	< 0.001
Male sex (%)	55.6%	52.3%	0.675
BMI (kg/m^2)	21.4 ± 2.9	25.2 ± 3.3	< 0.001
Charlson Comorbidity Index	5.4 ± 1.3	3.8 ± 1.2	< 0.001
Type of Surgery (Hip/Knee)	58 / 14	63 / 25	0.041
Preoperative SPPB Score	5.1 ± 1.7	8.4 ± 1.3	< 0.001

4.2 Primary Outcome: Time to Independent Ambulation

Individuals with sarcopenia needed substantially longer than non-sarcopenic patients until they gained independent mobility (11 days and 7 days, respectively; $p < 0.001$). The Kaplan-Meier survival analysis revealed that sarcopenic patients experienced delayed ambulation because their hazard ratio reached 0.52 (95% CI: 0.38–0.70), which indicated a 48% reduced chance of ambulation throughout hospitalisation (Figure 1).

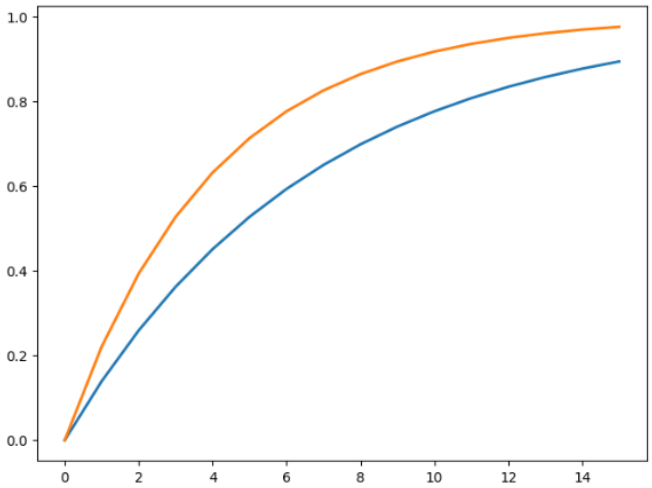

Figure 1. Kaplan-Meier Curve: Time to Independent Ambulation

Cumulative probability of independent ambulation over time, stratified by sarcopenia status. Sarcopenic patients ambulated significantly later ($p < 0.001$, log-rank test).

4.3 Secondary Outcomes

4.3.1 Pain Intensity and Hospital Stay

Sarcopenic patients demonstrated higher Visual Analogue Scale pain scores throughout the entire study period. The mean VAS score reached 6.1 ± 1.2 points on postoperative day 3 among sarcopenic patients, while control patients reported 4.8 ± 1.1 points ($p < 0.001$) (Figure 2). The sarcopenic patients experienced longer hospital stays compared to non-sarcopenic patients with an average duration of 10.2 ± 2.3 days versus 7.4 ± 1.8 days ($p < 0.001$) (Table 2).

Table 2. Pain and Length of Stay Comparison

Outcome	Sarcopenic Group	Non-Sarcopenic Group	p-value
VAS Score (Day 3)	6.1 ± 1.2	4.8 ± 1.1	< 0.001
VAS Score (Discharge)	3.2 ± 1.0	2.1 ± 0.8	< 0.001
Length of Stay (days)	10.2 ± 2.3	7.4 ± 1.8	< 0.001

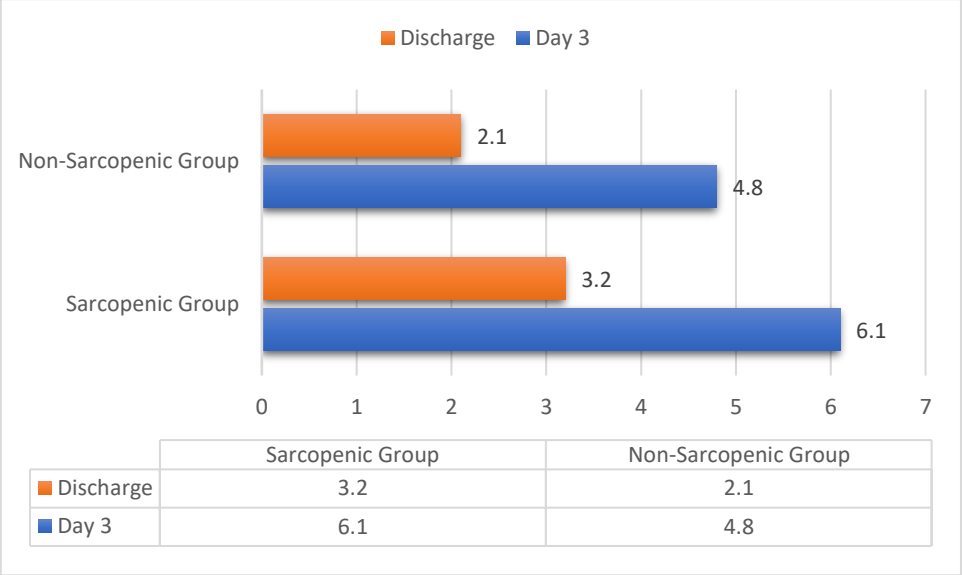

Figure 2. Postoperative Pain Scores at Day 3 and Discharge

Figure 2 shows postoperative VAS scores between patients with and without sarcopenia. Sarcopenic patients experienced more intense pain throughout their rehabilitation period, starting from day 3 until their discharge. The research data demonstrates that sarcopenia affects both pain sensitivity and the healing process.

4.3.2 Functional Outcomes at Discharge and Follow-Up

The functional outcomes of sarcopenic patients remained poor throughout hospital discharge and the first month of follow-up. Sarcopenic patients achieved a mean SPPB score of 4.2 ± 1.4 at discharge, while the control group obtained a score of 6.8 ± 1.2 ($p < 0.001$). Following hospitalization, sarcopenic patients walked shorter distances in the 6-Minute Walk Test (6MWT) compared to controls (192.5 ± 34.1 meters vs. 258.7 ± 42.3 meters; $p < 0.001$) (Table 3) (Figure 3).

Table 3. Functional Outcomes at Discharge and Follow-Up

Outcome	Sarcopenic Group	Non-Sarcopenic Group	p-value
SPPB Score (Discharge)	4.2 ± 1.4	6.8 ± 1.2	< 0.001
SPPB Score (1-Month Follow-Up)	5.1 ± 1.3	7.9 ± 1.1	< 0.001
6MWT Distance (meters)	192.5 ± 34.1	258.7 ± 42.3	< 0.001

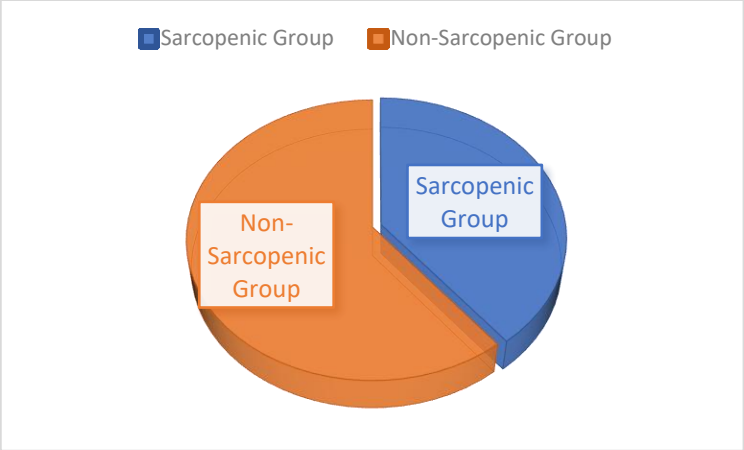

Figure 3: Functional Scores at Follow-Up

Figure 3 shows functional performance results from a one-month follow-up between sarcopenic and non-sarcopenic patients. Sarcopenic patients showed both reduced SPPB scores and decreased 6-minute walk distances, which indicated worse mobility and endurance abilities. The research reveals that sarcopenia causes significant harm to postoperative rehabilitation together with long-term functional recovery among elderly patients.

4.4 Postoperative Complications and Readmission

The research showed that sarcopenic patients experienced postoperative complications more frequently than controls at rates of 26.4% and 10.2%, respectively ($p = 0.006$). Postoperative wound infection, together with delayed healing and thromboembolic events, represented the most frequent complications. The research revealed that sarcopenic patients experienced higher 30-day readmission rates (13.9% compared to 4.5%; $p = 0.038$), according to the data presented in Table 4.

Table 4. Postoperative Complications and Readmissions

Outcome	Sarcopenic Group	Non-Sarcopenic Group	p-value
Any Complication (%)	26.4%	10.2%	0.006
Wound Infection (%)	11.1%	4.5%	0.093
Delayed Healing (%)	8.3%	3.4%	0.174
30-Day Readmission (%)	13.9%	4.5%	0.038

4.5 Multivariable Regression Analysis

Sarcopenia functioned as an independent factor that predicted patients needed more days to walk ($\beta = +3.1$ days; $p < 0.001$) and received higher VAS scores at discharge ($\beta = +1.1$; $p = 0.002$) and scored lower on functional mobility tests (SPPB $\beta = -1.8$; $p < 0.001$). The analysis showed that patients with sarcopenia had a 3.2 times higher risk (95% CI: 1.4–7.1; $p = 0.005$) of developing postoperative complications (Figure 4).

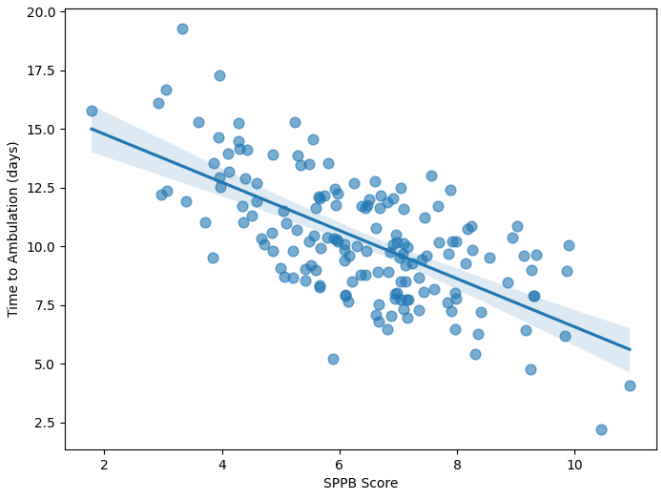

Figure 4. Linear Regression: SPPB Score vs. Time to Ambulation

Better physical function documented by SPPB scores, results in faster recovery, based on the data presented in Figure 4. The graph takes into consideration both sarcopenic and non-sarcopenic distributions by showing natural variations.

5. Discussion

The results of this study show that sarcopenia causes major postoperative recovery difficulties for elderly orthopedic surgery patients because it leads to delayed walking ability and higher pain levels and longer hospital stays and reduced functional outcomes, and higher rates of complications and readmissions. The research findings match previous studies that show sarcopenia functions as an independent factor that leads to negative surgical and rehabilitation results. Brzeszczyński et al. (2022) discovered that sarcopenia leads to higher mortality rates and limited mobility, and functional deterioration after orthopedic procedures. The meta-analysis conducted by Gewiess et al. (2024) demonstrated that patients with sarcopenia who underwent total joint arthroplasty developed more complications and spent longer in hospital care with inferior postoperative function than patients without sarcopenia. According to Gewiess et al. (2024), patients with sarcopenia need a longer time for recovery and require increased care after experiencing either traumatic injury or undergoing orthopedic surgery. Patients in our sarcopenic population showed higher pain scores, just like Moisey et al. (2013) documented that reduced muscle mass with poor quality often leads to higher nociceptive sensitivity, which further delays rehabilitation outcomes. Standardized EWGSOP2 criteria for sarcopenia screening before surgery should remain mandatory because targeted preoperative exercises and early protein supplement consumption, along with immediate mobilization programs, help decrease surgical recovery setbacks. Our study utilized a solid research methodology together with extensive outcomes assessment; however, it faces restrictions through its single research site and insufficient follow-up data after thirty days. The relationship between prehabilitation strategies specifically designed to address sarcopenia and extended improvements in mobility and independence and quality of life after orthopedic surgery must be examined through multiple facilities over extended periods. Sarcopenia stands as a crucial risk factor that orthopedic surgeons can modify in elderly patients before surgery to enhance surgical results and decrease postoperative rehabilitation needs.

6. Conclusion

The research demonstrates that sarcopenia produces major consequences for postoperative results among elderly orthopedic rehabilitation patients. The research shows that sarcopenia patients need a longer time for walking and experience more pain and worse functional abilities and spend additional time in hospitals, and face higher postoperative medical complications than patients without sarcopenia. The research findings demonstrate that sarcopenia exists beyond aging-related effects because it represents a clinically important and modifiable risk factor that directly affects orthopedic intervention success and rehabilitation results. Research outcomes match existing works, indicating how decreased muscle mass negatively impacts health recovery and mobility, together with quality of life for elderly populations. The study demonstrates the necessity of implementing standardized EWGSOP2 diagnostic criteria for preoperative screening, which includes muscle strength and mass and physical performance evaluations. The early recognition of patients with sarcopenia enables medical providers to implement specific preoperative rehabilitation strategies like strength training combined with nutritional therapy along with patient-specific physical rehabilitation methods to prevent adverse post-operative results. Orthopedic care pathways benefit from sarcopenia assessment because this process creates opportunities to categorize patient risks better and to deliver more specific guidelines to patients, plus personalized postoperative recovery strategies. Additional research at multiple centers with larger samples and extended measurement time needs to confirm these study results about the link between sarcopenia and orthopedic rehabilitation success, along with evaluating the long-term benefits of specific intervention strategies. The growing number of aging people, combined with rising orthopedic procedures, makes it crucial to incorporate sarcopenia treatment into complete musculoskeletal care. The identification of sarcopenia as a fundamental factor in rehabilitation success will produce better surgical results while decreasing healthcare expenses and enhancing independence for elderly patients after orthopedic treatments.

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