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Effect of Chair-Based Exercise on Lower Limb Strength and Dynamic Balance in Older Adults: A Systematic Review

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Abstract

Background: Aging is associated with declines in muscle mass, strength, postural control, and dynamic balance, increasing fall risk and reducing functional independence in older adults. Chair-based exercise (CBE) is a safe and accessible intervention for individuals with limited mobility.

Objective: To evaluate the effects of chair-based exercise on lower limb muscle strength and dynamic balance in older adults.

Methods: This systematic review followed PRISMA 2020 guidelines. Literature searches were conducted in PubMed, Scopus, ScienceDirect, and Google Scholar for studies published between 2021 and 2025. Keywords included chair-based exercise, older adults, lower limb strength, dynamic balance, Timed Up and Go, and the 30-second chair stand test. Studies were selected using PICOS criteria. Risk of bias was assessed using the PEDro scale. Due to heterogeneity in study design, interventions, and outcomes, a narrative synthesis was performed.

Results: Eight studies were included. Chair-based and sit-to-stand exercises consistently improved lower limb muscle strength, particularly in the 30-second chair stand test. Improvements in dynamic balance were also reported, commonly measured using the Timed Up and Go test and Berg Balance Scale. However, the evidence strength was limited by small sample sizes, heterogeneous protocols, and variable methodological quality.

Conclusion: Chair-based exercise is a safe and feasible intervention with the potential to improve lower limb strength and dynamic balance in older adults. However, findings should be interpreted cautiously due to the moderate-to-high risk of bias.

Keywords
Chair-Based Exercise; Aged; Lower Limb Muscle Strength; Dynamic Balance; Timed Up and Go

Introduction

The global increase in life expectancy has led to a rapid growth in the older adult population, accompanied by a higher prevalence of age-related functional decline. Aging is characterized by progressive reductions in skeletal muscle mass, muscle strength, neuromuscular coordination, and postural control, which collectively contribute to impaired mobility and decreased independence.[1] These physiological changes are strongly associated with an increased risk of falls, a major public health concern among older adults.[2] Falls are recognized as one of the leading causes of injury-related morbidity and mortality in this population, significantly impacting quality of life and healthcare systems.[3]

Lower limb muscle strength plays a central role in maintaining functional independence. Muscles such as the quadriceps, hamstrings, gastrocnemius, and hip stabilizers are essential for fundamental daily activities, including standing from a seated position, walking, stair negotiation, and maintaining upright posture.[4] Declines in lower limb strength are associated with reduced mobility performance, slower gait speed, and increased fall risk.[5] Functional assessments such as the 30-second chair stand test are widely used to evaluate lower limb strength and endurance in older adults, as they closely reflect real-life functional demands.[6]

In addition to muscle strength, dynamic balance is a critical determinant of safe mobility. Dynamic balance involves the integration of sensory input from the visual, vestibular, and somatosensory systems, along with appropriate neuromuscular responses to maintain stability during movement.[7] Impairments in dynamic balance are closely linked to increased fall incidence. Clinical tools such as the Timed Up and Go (TUG) test and Berg Balance Scale are commonly used to assess functional mobility and fall risk in older populations. Evidence from recent systematic reviews indicates that exercise-based interventions can significantly improve balance performance and reduce fall risk in older adults.[8]

Exercise interventions are therefore widely recommended as a primary strategy for fall prevention and functional improvement in aging populations. A growing body of evidence suggests that structured exercise programs can enhance muscle strength, balance control, gait stability, and overall physical function, ultimately reducing fall incidence.[8] However, conventional exercise programs often require standing balance, mobility, or supervision, which may limit participation among frail older adults or those with mobility impairments.

Chair-based exercise (CBE) has emerged as a practical and accessible alternative for this population. CBE utilizes a chair as a primary support, allowing exercises to be performed in seated, supported standing, or sit-to-stand positions.[9] This approach provides a stable base of support, reduces fear of falling, and enables individuals with limited mobility to engage safely in physical activity. Recent evidence indicates that chair-based exercise programs can improve lower extremity function, particularly in measures such as the 30-second chair stand test, as well as contribute to improvements in balance and functional performance.[10]

Furthermore, chair-based resistance and functional training have been shown to enhance multiple domains of physical functioning, including endurance, balance, and psychological well-being in older adults residing in long-term care settings.[11] Despite these promising findings, the effects of CBE on dynamic balance remain inconsistent across studies. Some evidence suggests

meaningful improvements in dynamic balance outcomes, while other studies report limited or non-significant effects, potentially due to differences in intervention intensity, duration, and population characteristics.[12]

Another important limitation in the current literature is the heterogeneity of study designs, intervention protocols, and outcome measures. Many studies include small sample sizes, non-randomized designs, or lack standardized exercise dosage, which reduces the strength of evidence and limits generalizability. In addition, previous reviews have often focused broadly on physical function without specifically distinguishing between lower limb muscle strength and dynamic balance as primary outcomes.

Given these limitations, there remains a need for a focused and methodologically structured synthesis of current evidence that specifically examines the effects of chair-based exercise on lower limb muscle strength and dynamic balance in older adults. Clarifying these effects is essential to support evidence-based physiotherapy practice and to guide the development of safe, feasible, and effective exercise interventions tailored to the needs of aging populations.

Therefore, this systematic review aims to evaluate the effects of chair-based exercise on lower limb muscle strength and dynamic balance in older adults by synthesizing recent evidence using a structured and transparent methodological approach.

Methods

This study was conducted as a systematic review to synthesize current evidence regarding the effects of chair-based exercise on lower limb muscle strength and dynamic balance in older adults. The reporting of this review followed the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) 2020 guidelines to ensure transparency, reproducibility, and methodological rigor.[13,14] Given the anticipated heterogeneity in study design, intervention protocols, and outcome measures, a quantitative meta-analysis was not performed, and findings were synthesized narratively.

A comprehensive literature search was carried out across four electronic databases, namely PubMed, Scopus, ScienceDirect, and Google Scholar. The search was limited to articles published between January 2021 and December 2025 to ensure the inclusion of recent and relevant evidence. A combination of controlled vocabulary and free-text terms was used, structured using Boolean operators. The core search terms included “chair-based exercise,” “chair exercise,” “seated exercise,” “older adults,” “aged,” “lower limb muscle strength,” “dynamic balance,” “Timed Up and Go,” and “30-second chair stand.” The search strategy was adapted for each database to optimize sensitivity and specificity. Reference lists of included studies were also manually screened to identify additional relevant articles that may not have been captured through database searching.

Eligibility criteria were defined using the PICOS framework. The population included individuals aged 60 years or older, or studies in which the majority of participants were classified as older adults. The intervention of interest was any form of chair-based exercise, including seated exercise, sit-to-stand training, or chair-supported strengthening and balance exercises. Studies were included regardless of whether the intervention was delivered in clinical, community, or long-term care settings. Comparators included no intervention, usual care, alternative exercise programs, or pre–post comparisons within a single group. The primary outcomes of interest were lower limb muscle strength and dynamic balance. Lower limb strength was primarily assessed using the 30-second chair stand test or equivalent functional strength measures, while dynamic balance was assessed using validated instruments such as the Timed Up and Go (TUG) test or the Berg Balance Scale. Eligible study designs included randomized controlled trials, quasi-experimental studies, pre–post intervention studies, cohort studies, and service development studies with functional evaluation. Systematic reviews and meta-analyses were not treated as primary evidence but were retained to provide contextual support for interpretation.

Studies were excluded if they did not involve a chair-based intervention, did not include older adult populations, or did not report outcomes related to lower limb strength or dynamic balance. Additional exclusion criteria included non-peer-reviewed publications, conference abstracts without full text, duplicate publications, and articles not available in full-text English. All identified records were imported into a reference management system to facilitate duplicate removal and screening. Study selection was conducted in two stages. First, titles and abstracts were screened based on the predefined eligibility criteria. Second, full-text articles were assessed for inclusion.

A total of 205 records were identified through database searching, including PubMed (n = 42), Scopus (n = 38), ScienceDirect (n = 51), and Google Scholar (n = 74). After the removal of 47 duplicate records, 158 studies remained for title and abstract screening. Following the screening process, 132 records were excluded because they did not meet the eligibility criteria. Subsequently, 26 full-text articles were assessed for eligibility. Of these, 18 articles were excluded for several reasons, including interventions not involving chair-based exercise (n = 6), populations not classified as older adults (n = 4), outcomes unrelated to lower limb muscle strength or dynamic balance (n = 5), and unavailable or incomplete full-text articles (n = 3). Ultimately, eight studies met the inclusion criteria and were included in the qualitative synthesis (Figure 1).

Due to substantial heterogeneity in study design, intervention protocols, and outcome measures, quantitative meta-analysis was not performed.Data extraction was performed using a standardized form to ensure consistency and completeness. Extracted data included author and year of publication, country and study setting, study design, sample size and participant characteristics, details of the intervention (type, frequency, duration), comparator (if applicable), outcome measures, and main findings. Particular attention was given to outcomes directly related to lower limb muscle strength and dynamic balance. Inconsistencies identified in the initial manuscript, such as the inclusion of unrelated outcomes (e.g., trunk flexibility), were corrected to align with the objectives of the review.

The primary outcomes of interest were clearly defined to enhance methodological consistency. Lower limb muscle strength was operationalized using functional measures such as the 30-second chair stand test, which has demonstrated good validity and reliability in assessing lower extremity strength in older adults. Dynamic balance was assessed using clinically established tools such as the Timed Up and Go test and the Berg Balance Scale, both of which are widely used to evaluate mobility and fall risk. These instruments were selected due to their strong psychometric properties and widespread use in geriatric rehabilitation research.

The methodological quality and risk of bias of included primary studies were assessed using the Physiotherapy Evidence Database (PEDro) scale.[15] The PEDro scale evaluates key methodological criteria, including random allocation, allocation concealment, baseline comparability, blinding, adequacy of follow-up, intention-to-treat analysis, between-group comparisons, and reporting of point estimates and variability. The total score ranges from 0 to 10, with higher scores indicating better methodological quality. For non-randomized studies, the PEDro scale was applied cautiously and interpreted descriptively, recognizing its limitations outside randomized controlled trial designs. Systematic reviews and meta-analyses were not assessed using PEDro, as they do not constitute primary interventional evidence.

Given the heterogeneity of study designs, intervention protocols, and outcome measures, statistical pooling was not considered appropriate. Therefore, a narrative synthesis approach was employed. Findings were synthesized by grouping studies

based on their reported outcomes, specifically lower limb muscle strength and dynamic balance. The direction and consistency of effects, as well as the methodological quality of the studies, were considered in formulating overall conclusions. Reported statistical values such as p-values, mean differences, or effect sizes were presented only when extracted directly from the original studies, and no additional statistical analyses were performed by the review authors.

Ethical approval was not required for this study, as it was based solely on the analysis of previously published data and did not involve direct human participation.

Results

This section presents the findings of the systematic review in a structured manner, focusing on study selection, characteristics of included studies, methodological quality, and the effects of chair-based exercise on lower limb muscle strength and dynamic balance.

To ensure transparency in the study selection process, a PRISMA 2020 flow diagram was constructed (Figure 1). A total of 205 records were identified through database searching, including PubMed (n = 42), Scopus (n = 38), ScienceDirect (n = 51), and Google Scholar (n = 74). After removal of 47 duplicate records, 158 articles remained for title and abstract screening. Following screening, 132 records were excluded due to irrelevance to the review objectives. Twenty-six full-text articles were subsequently assessed for eligibility. Of these, 18 articles were excluded for reasons including non-chair-based interventions, inappropriate population, unrelated outcomes, or unavailable full text. Ultimately, eight studies met the inclusion criteria and were included in the qualitative synthesis (Figure 1).

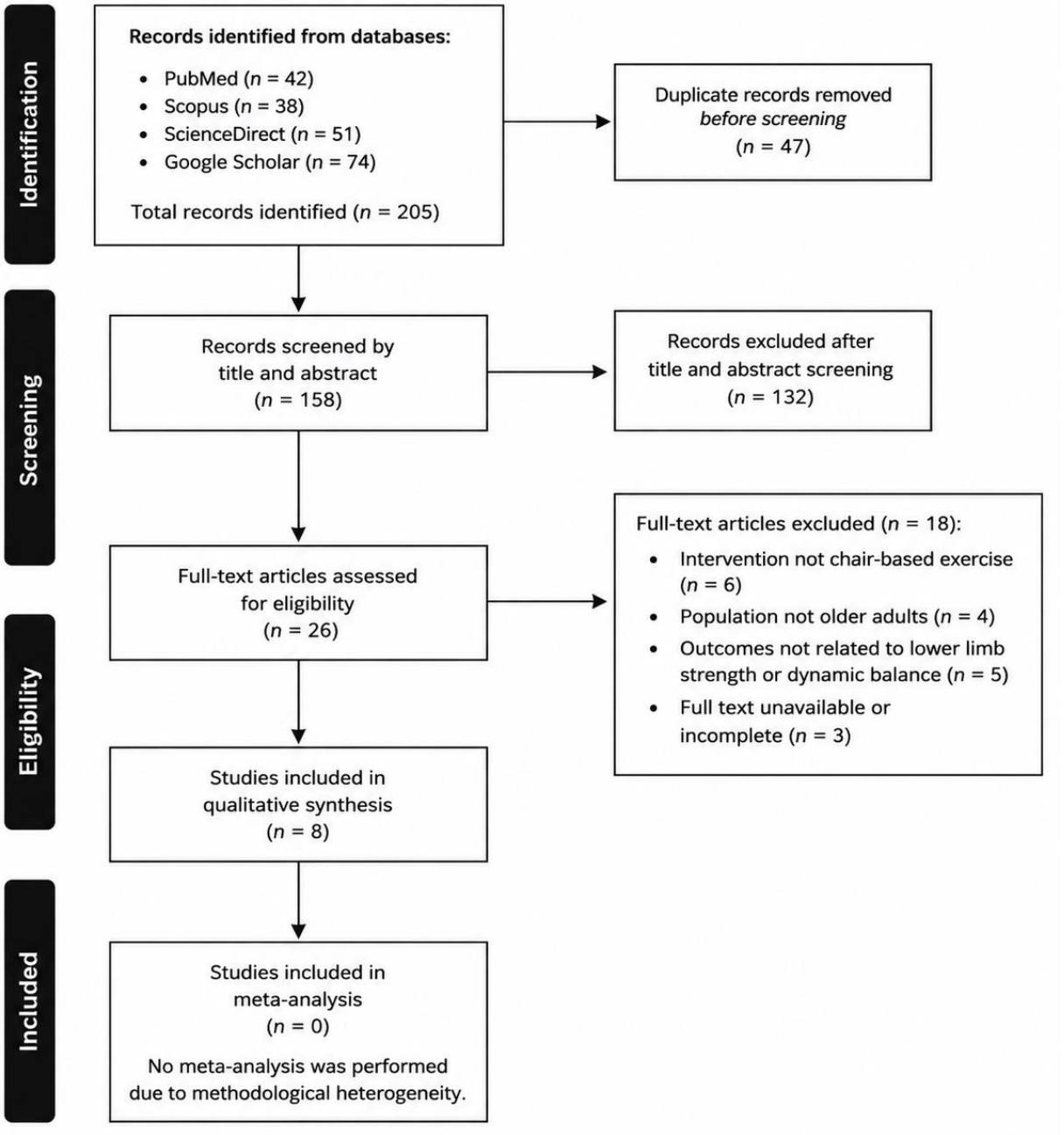

Figure 1. PRISMA 2020 flow diagram of study selection process.

To provide an overview of the included evidence, the main characteristics of the studies are summarized in Table 1. This table outlines the study design, population, intervention characteristics, comparator, outcome measures, and key findings, allowing readers to understand the scope and variability of the included evidence.

Table 1. Summary of Included Studies on Chair-Based Exercise in Older Adults

Primary Intervention Studies

Author (Year)	Country/Setting	Study Design	Sample	Intervention	Comparator	Outcomes	Main Findings
Nadia et al. (2024)[16]	Indonesia; BPSTW Abiyoso Pakem	Quasi-experimental (one-group pre-post)	24 older adults	Chair-based exercise	None	Trunk flexibility	Improved trunk flexibility
Ramasari & Mutnawasitoh (2024)[17]	Indonesia; community setting	Quasi-experimental (two-group)	50 older adults	Chair-based vs core stability exercise	Core stability exercise	Lumbar flexibility	Both groups improved
Wood et al. (2021)[18]	UK; geriatric outpatient service	Service development	Older adults with low strength/balance	Chair-based exercise class	None/unclear	TUG, BBS	Safe and feasible intervention
Wisyastuti et al. (2024)[19]	Indonesia; LKS Batara Gowa	Randomized controlled trial	40 older adults	Strength and balance training	Usual exercise	30-s chair stand, BBS	Improved strength and balance
Sholikah & Zaidah (2025)[20]	Indonesia; nursing home	Quasi-experimental (two-group)	40 older adults	Seated exercise	Heel raises exercise	TUG	Both interventions improved TUG
Yoshimura et al. (2022)[21]	Japan; rehabilitation hospital	Retrospective cohort	302 older stroke patients	Repetitive chair-stand + rehabilitation	Low vs high frequency	Sarcopenia, SMI, handgrip	Higher frequency improved muscle outcomes

Contextual Systematic Reviews and Meta-Analyses

Author (Year)	Study Type	Participants	Main Outcomes	Key Findings
Efendi et al. (2023)[8]	Systematic review and meta-analysis	9 RCTs; 878 participants	ADL, endurance, balance	Chair-based resistance exercise improved lower limb endurance and balance
Klempel et al. (2021)[10]	Systematic review and meta-analysis	25 studies; 1,388 participants	Lower limb function, balance, gait	Chair-based exercise improved lower limb function; balance effects varied

Across the eight included studies, considerable heterogeneity was observed in terms of study design, intervention protocols, and outcome measures. The included studies comprised randomized controlled trials, quasi-experimental studies, service development reports with functional evaluation, retrospective cohort studies, and systematic reviews/meta-analyses used as contextual evidence. Sample sizes varied substantially, ranging from small community-based cohorts to larger multi-center datasets. Interventions differed in frequency, duration, and exercise components, including seated strengthening, sit-to-stand training, and resistance-based chair exercises. Outcome measures also varied, although the most frequently reported indicators were the 30-second chair stand test for lower limb strength and the Timed Up and Go (TUG) test or Berg Balance Scale for dynamic balance.

To assess the methodological rigor of the included primary studies, the risk of bias was evaluated using the PEDro scale. The results of this assessment are presented in Table 2. This table provides a structured overview of PEDro scores, methodological strengths, and key limitations of each study, enabling a critical appraisal of the evidence base.

Table 2. Risk of Bias Assessment Using PEDro Scale

Study	Design	PEDro Score	Risk Level	Key Limitations
Nadia et al. (2024)[16]	One-group quasi-experimental	2/10	High	No control group, no randomization, no blinding
Ramasari & Mutnawasitoh (2024)[17]	Two-group quasi-experimental	4/10	Moderate-high	No allocation concealment, no blinding
Wood et al. (2021)[18]	Service development/pre-post	1/10	High	No control group, limited methodological detail
Wisyastuti et al. (2024)[19]	Randomized controlled trial	5/10	Moderate	Unclear allocation concealment, no blinding, no intention-to-treat analysis
Sholikah & Zaidah (2025)[20]	Two-group quasi-experimental	4/10	Moderate-high	Short intervention duration, no randomization/blinding
Yoshimura et al. (2022)[21]	Retrospective cohort	Adapted 4/10	High	Observational design, potential confounding bias
Efendi et al. (2023)[8]	Systematic review and meta-analysis	Not assessed	Contextual evidence	Secondary evidence, not primary interventional study
Klempel et al. (2021)[10]	Systematic review and meta-analysis	Not assessed	Contextual evidence	Secondary evidence, heterogeneous included studies

Notes: PEDro = Physiotherapy Evidence Database; ITT = Intention-to-Treat.

The methodological quality of the included primary studies ranged from low to moderate. Common limitations included the absence of randomization, lack of allocation concealment, limited or absent blinding, small sample sizes, and incomplete reporting of intention-to-treat analysis. Randomized controlled trials demonstrated relatively higher methodological quality compared to quasi-experimental and observational studies. Systematic reviews and meta-analyses were not assessed using the PEDro scale because they do not constitute primary interventional evidence and were included only as contextual support for interpretation.

With respect to the primary outcome of lower limb muscle strength, the evidence consistently indicated a positive effect of chair-based exercise. Studies incorporating sit-to-stand movements or functional strengthening exercises reported improvements in performance-based measures, particularly the 30-second chair stand test. These findings suggest that chair-based interventions effectively target key muscle groups involved in functional mobility, including the quadriceps, hamstrings, and hip stabilizers. Evidence from contextual systematic reviews further supports these findings, indicating that chair-based exercise programs can improve lower extremity function and muscular endurance in older adults.

Additional evidence from observational data suggests that higher frequency of chair-stand exercise may be associated with improvements in muscle mass and strength-related indicators, such as skeletal muscle index and handgrip strength. However, due to the observational nature of these studies, causal relationships cannot be definitively established.

In contrast to the relatively consistent findings for muscle strength, the effects of chair-based exercise on dynamic balance were more variable. Several studies reported improvements in dynamic balance, as reflected by reduced completion time in the Timed Up and Go test and increased scores on the Berg Balance Scale. These findings indicate enhanced functional mobility and postural control following intervention.

However, not all studies demonstrated statistically or clinically significant improvements in balance outcomes. Variability in results may be attributed to differences in intervention characteristics, including duration, intensity, and the inclusion of specific balance training components. Interventions that incorporated progressive functional movements, such as sit-to-stand transitions, weight shifting, and coordinated lower limb activity, appeared more likely to produce improvements in dynamic balance compared to programs focused primarily on seated strengthening exercises.

The overall synthesis of evidence suggests that chair-based exercise has a stronger and more consistent effect on lower limb muscle strength than on dynamic balance. While improvements in balance are frequently observed, they appear to be influenced by additional factors beyond muscle strength alone, including neuromuscular coordination, sensory integration, and task-specific training.

Importantly, the interpretation of these findings must consider the methodological limitations identified across the included studies. The predominance of non-randomized designs, small sample sizes, and incomplete reporting reduces the certainty of the evidence. Furthermore, the heterogeneity of interventions and outcome measures limits comparability across studies and precludes quantitative synthesis.

Taken together, the results indicate that chair-based exercise is a promising intervention for improving lower limb function in older adults, with consistent evidence supporting its role in enhancing muscle strength. Evidence for improvements in dynamic balance is encouraging but less consistent, highlighting the need for more rigorously designed studies with standardized protocols and outcome measures.

Discussion

This systematic review aimed to evaluate the effects of chair-based exercise on lower limb muscle strength and dynamic balance in older adults. The findings indicate that chair-based exercise consistently improves lower limb muscle strength, while its effects on dynamic balance are more variable and appear to depend on intervention characteristics and contextual factors. These results provide important insights into the role of chair-based exercise as a feasible physiotherapy intervention for aging populations, while also highlighting limitations in the current evidence base.[11]

The most robust finding of this review is the consistent improvement in lower limb muscle strength following chair-based exercise interventions. This effect is likely attributable to the functional nature of many chair-based movements, particularly sit-to-stand transitions, which involve repeated concentric and eccentric contractions of key muscle groups such as the quadriceps, hamstrings, and gluteal muscles.[6] These movements closely mimic daily functional tasks, thereby promoting task-specific neuromuscular adaptations. Previous evidence supports this mechanism, indicating that functional resistance exercises targeting lower extremities can significantly enhance muscle strength and physical performance in older adults.[22] The improvement observed in measures such as the 30-second chair stand test further reinforces the ecological validity of chair-based exercise as a clinically relevant intervention.[23]

In addition to strength improvements, chair-based exercise may contribute to enhanced muscle endurance and overall functional capacity. Evidence from multi-study analyses suggests that chair-based resistance training programs can improve lower limb endurance and support activities of daily living in older adults, particularly in long-term care settings.[8] These findings align with the present review, where repeated functional movements and progressive exercise exposure appear to underpin observed improvements in physical performance. However, it is important to recognize that the magnitude of these benefits may vary depending on exercise dosage, including frequency, intensity, and duration.[24]

In contrast, the effects of chair-based exercise on dynamic balance were less consistent across studies. While several studies reported improvements in outcomes such as the Timed Up and Go test and Berg Balance Scale, others demonstrated limited or non-significant changes.[25] This variability can be explained by the multifactorial nature of dynamic balance, which extends beyond muscle strength to include sensory integration, postural control strategies, reaction time, and cognitive processing.[26] Improvements in balance therefore require not only strengthening exercises but also task-specific and progressively challenging balance training components. Interventions that incorporated elements such as weight shifting, coordinated stepping, and functional transitions appeared more effective in improving dynamic balance compared to those focused solely on seated strengthening exercises.[27]

These findings are consistent with previous literature suggesting that multicomponent exercise programs, combining strength, balance, and coordination training, are more effective in reducing fall risk than single-component interventions. The relatively modest effects of chair-based exercise on balance observed in this review may therefore reflect limitations in intervention design rather than ineffectiveness of the approach itself.[10] Programs that lack sufficient progression or fail to challenge postural stability may not provide adequate stimulus for meaningful balance adaptation.[28]

Another important consideration is the heterogeneity of the included studies, which represents a key limitation of the current evidence base. Substantial variability was observed in study design, sample characteristics, intervention protocols, and outcome measures. This heterogeneity limits direct comparability between studies and precludes quantitative synthesis. Furthermore, many of the included studies employed non-randomized designs or small sample sizes, which increases the risk of bias and reduces confidence in the observed effects.

The risk of bias assessment using the PEDro scale further supports this concern. Most primary studies were rated as having low to moderate methodological quality, with common limitations including lack of randomization, absence of allocation concealment, and limited use of blinding. These methodological shortcomings introduce potential sources of bias, such as selection bias and detection bias, which may overestimate treatment effects. Even in randomized controlled trials, incomplete reporting of key methodological elements limits interpretability and reproducibility.

From a clinical perspective, chair-based exercise offers several practical advantages that support its implementation in older adult populations. The use of a chair as a stable base of support reduces the risk of falls and may increase confidence and adherence among individuals with mobility limitations or fear of falling. Additionally, chair-based exercise is relatively low-cost, easy to implement

in various settings, and adaptable to individual functional levels. These characteristics make it particularly suitable for community-based and home-based rehabilitation programs.

However, the findings of this review also suggest that chair-based exercise should not be considered a standalone intervention for improving dynamic balance or preventing falls, particularly in high-risk populations. Instead, it may be more effective when integrated into a broader, multicomponent exercise program that includes progressive balance training, gait training, and functional mobility exercises. Such an approach is more likely to address the complex and multifactorial determinants of balance and fall risk.

This review also addressed several methodological concerns identified in the initial manuscript. First, inappropriate statistical analyses that were previously included have been removed to ensure consistency with systematic review methodology. Second, outcome measures have been clearly aligned with the objectives of the study, focusing specifically on lower limb muscle strength and dynamic balance. Third, systematic reviews included in the evidence base were appropriately treated as contextual support rather than primary data sources, thereby avoiding methodological inconsistencies in risk of bias assessment.

Despite its strengths, this review has several limitations that should be acknowledged. The absence of complete search logs limited the ability to fully report the study selection process, reducing transparency. Additionally, the inclusion of heterogeneous study designs and outcome measures limits the strength of conclusions. The reliance on narrative synthesis, while appropriate given the data, may introduce subjectivity in interpretation. Finally, the inclusion of studies with moderate to high risk of bias reduces the overall certainty of evidence.

Future research should prioritize well-designed randomized controlled trials with larger sample sizes, standardized intervention protocols, and clearly defined outcome measures. Long-term follow-up is also needed to determine whether improvements in strength and balance translate into meaningful reductions in fall incidence and improved quality of life. Furthermore, studies should consider incorporating multidimensional outcomes, including functional independence, psychological well-being, and adherence to exercise programs.

Conclusion

This systematic review evaluated the effects of chair-based exercise on lower limb muscle strength and dynamic balance in older adults. The findings indicate that chair-based exercise consistently improves lower limb muscle strength, particularly through functional movements such as sit-to-stand, which directly target key muscle groups involved in daily activities. In contrast, improvements in dynamic balance were observed but remained less consistent across studies, likely influenced by differences in intervention design and the multifactorial nature of balance control.

From a clinical perspective, chair-based exercise represents a safe, feasible, and accessible intervention for older adults, especially those with limited mobility or fear of falling. Its implementation may support improvements in functional capacity and serve as an entry-level exercise modality in rehabilitation or community settings. However, given the variability in balance-related outcomes, chair-based exercise should ideally be integrated into multicomponent exercise programs that include progressive balance and mobility training to optimize fall prevention strategies.

The overall certainty of evidence remains limited due to methodological weaknesses in several included studies, including small sample sizes, non-randomized designs, and incomplete reporting. Therefore, findings should be interpreted with caution. Future research should focus on well-designed randomized controlled trials with standardized intervention protocols, adequate sample sizes, and long-term follow-up. Further investigation is also needed to determine the optimal exercise dosage and to assess the impact of chair-based exercise on clinically meaningful outcomes such as fall incidence and functional independence.

Author Contribution

Angelita Annundra Engkalma Balowahani: Conceptualization, methodology, data curation, formal analysis, writing original draft, and writing review and editing.

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Conflict of Interest Statement

The author declares no conflict of interest.

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Ethics Statement

Ethical approval was not required for this study as it was based exclusively on previously published data and did not involve direct human participation.

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