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Muscle Strength Affects Body Balance in the Elderly: Systematic Review and Meta-analysis.

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Abstract. Every older adult will naturally experience a decline in muscle strength, including the muscles of their limbs, which can impair their ability to perform activities. One of the consequences of reduced muscle strength is the increased risk of falling or maintaining a stable body posture, commonly referred to as body balance. Balance disturbances in older adults lead to a higher risk of falling. Falls are a leading cause that can result in both fatal and non-fatal consequences for older adults, being a primary cause of morbidity and mortality in this population. The aim is to identify, evaluate, and synthesize all relevant articles regarding the impact of muscle strength on balance disturbances in older adults. The data collection method sourced from PubMed from 2014-2024. Data regarding the influence of muscle strength on balance disorders in the elderly. The results indicate that out of 5 articles, 3 articles discuss muscle strength and its impact on body balance in the elderly. Additionally, there is 1 article that discusses body balance in the elderly and 1 article that discusses muscle strength in the elderly. The conclusion of the studies published in PubMed regarding muscle strength and its effects on the body balance of the elderly from 2014 to 2024 includes 5 articles.

Keywords: Body Balance, Muscle Strength, Elderly

INTRODUCTION

The number and proportion of people aged 60 and over in the population continue to increase. This increase is occurring at an unprecedented rate and will accelerate in the coming decades, especially in developing countries (WHO, 2025). The aging process is the final stage of life. This aging process is a dynamic process that varies for each individual. Signs encountered in this aging process include a decline in physiological functions. One of the impacts of the body's physiological decline is balance disorders. Balance disorders in the elderly increase the risk of falling. Falls are a leading cause that can result in both fatal and non-fatal outcomes for the elderly, being a primary cause of morbidity and mortality among older adults (Xing et al, 2023).

According to the World Health Organization (2025), the categories of older adults are middle age (45 - 59 years), elderly (60 - 74 years), old age (75 - 90 years), and very old age, which is above 90 years. Older adults have a higher risk of experiencing balance disorders caused by issues in the musculoskeletal system, the central nervous system, including sensory systems. (Xing et al, 2023)

Various changes in skeletal muscles occur with aging, the most prominent being the loss of muscle mass. Age-related muscle loss is one of the main causes of musculoskeletal disorders in the elderly. Musculoskeletal disorders are debilitating conditions that significantly disrupt health status, especially in older adults (Minetto et al, 2020). The incidence of falls not only hinders the elderly from performing daily activities but can also lead to fractures (commonly in the wrist, arm, ankle, and hip), head injuries, brain injuries, and psychological trauma that causes the elderly to be afraid of engaging in daily activities.

As a result of this degenerative process, the elderly will experience a decline both anatomically and functionally. Physical and psychological deterioration will be experienced by the elderly. One of the problems they face is balance issues. The elderly are at high risk of falling due to postural balance disturbances caused by the aging process (Yuliana, 2014), which will lead to muscle weakness and consequently reduce strength. The decrease in lower extremity muscles can result in slowed movement, shorter steps, and less stable footing, making them more prone to unsteadiness and reduced mobility. The elderly experience physical and psychological decline with good balance, which will reduce the risk of falls among the elderly. Various changes in the skeletal muscles occur as one ages, with the predominant change being the loss of muscle mass. The loss of muscle mass associated with aging is one of the main causes of musculoskeletal disorders in the elderly.

Musculoskeletal disorders are debilitating conditions that significantly disrupt health status, especially in older adults (Minetto et al, 2020). The incidence of falls not only hinders the elderly from performing daily activities but can also lead to fractures (commonly in the wrist, arm, ankle, and hip), head injuries, brain injuries, and even psychological trauma that causes the elderly to be afraid to engage in daily activities.

METHODS

Researchers reviewed journal articles from researchers published in PubMed between the years 2014-2024 and used databases that cover medicine, public health, and physiotherapy. After coding the articles based on publication year, journal field, country, methods, and health purposes identified in those articles.

Figure 1. data search mechanism

The data obtained consists of 5 articles that discuss muscle strength and human balance disorders.

RESULTS AND DISCUSSION

The data obtained consists of 5 articles discussing muscle strength and balance disorders in humans. Table 1. Five Articles Published in Pubmed About Muscle Strength That Affects Body Balance in the Elderly

No	Title	Author and publication (year)	Methods	Decision
1	Muscle Strength and Balance as Mediators in the Association between Physical Activity and Health-Related Quality of Life in Community-Dwelling Older Adults	Nascimento et al. 2022	A cross-sectional analytical observational study	Indicate the role that LEMS and BB play in the relationship between PA and HRQoL in the older population.
2	Skeletal Muscle Function Deficits in the Elderly: Current Perspectives on Resistance Training	Papa, E.V.*, Dong, X., and, Hassan, H., 2017	review focuses on skeletal muscle function deficits in the elderly and how these age-associated deficits	The most obvious consequence of sarcopenia is a loss of muscle strength; however there is a constellation of consequences greater than that of muscle size alone.
3	Balance and Muscle Strength in Elderly Women Who Dance Samba.	Serra et al (2016)	controlled cross-sectional study	Participation in the Wing of Baianas is associated with better balance with closed eyes, but there were no differences between dancers and non-dancers for muscle strength
4	Falls Caused By Balance Disorders In The Elderly With Multiple Systems Involved: Pathogenic Mechanisms And Treatment Strategies	Xing et al, 2023	review discusses	the pathogenesis and treatment of falls caused by balance disorders, a need remains for future large-scale multi-center randomized controlled trials and in-depth mechanism studies
5	Effects of Combined Balance and Strength Training on Measures of Balance and Muscle Strength in Older Women With a History of Falls	Zouita,et al (2020)	One group and control	The higher positive effects of training seen in standing balance tests, compared with dynamic tests, suggests that balance training exercises including lateral, forward, and backward exercises improved static balance to a greater extent in older women.

Table. 1. Illustrates that out of the 5 articles, there are 3 articles discussing muscle strength and its impact on body balance in the elderly. Additionally, there is 1 article discussing body balance in the elderly. There is also 1 article discussing muscle strength in the elderly.

Discussion

Research on the elderly certainly cannot be separated from the accompanying disturbances, both physical and non-physical. Of the 5 articles published in Pubmed, 3 of them discuss muscle strength and its impact on the balance of the elderly. Muscle strength is an important factor in maintaining body balance, especially in the elderly. This is as stated by Sari et al. (2022), which states that lower extremity muscle strength is an important factor for a person in standing, moving, and performing daily activities. Additionally, it is stated that the aging process leads to an inability to carry out daily activities. Active elderly individuals will move a lot, stimulating muscle contraction, with contractile protein synthesis occurring more rapidly, which will subsequently increase actin and myosin filaments in myofibrils, leading to an increase in muscle mass. Good muscle strength can help maintain body balance.

There is 1 article discussing balance in the elderly and 1 article discussing muscle strength. During the period from 2014 to 2024, research on body balance and muscle strength has not been widely published in Pubmed, making it difficult to compare in detail.

CONCLUSIONS

There are 5 articles published in Pubmed that discuss muscle strength affecting body balance in the elderly. Three out of the 5 articles discuss muscle strength affecting body balance in the elderly.

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