Effect of Balance Exercise on Reducing The Risk of Falls in The Elderly

Siti Saodah, Endam Apulina Br. Sembiring, dr. Ari Nugraha

Abstract

Health levels are influenced by many factors, one of which is the decline or physical changes that occur in the musculoskeletal system, namely reduced muscle mass, stiffness of connective tissue and osteoporosis. This can cause decreased muscle strength, especially lower extremity muscles, physical endurance, and coordination as well as limited mobility in the elderly. Reduced muscle strength and loss of balance put the elderly at a very high risk of falling, which can cause injury, reduced mobility, decreased independence, self-confidence and lifestyle changes and even death in the elderly. Prevention is the first step that must be taken, because if a fall occurs, complications can arise, even minor ones can be serious. Falls can be prevented by improving environmental conditions deemed unsafe, identifying risk factors, assessing balance and gait, and providing balance training. Balance exercises are a series of movements performed to improve static and dynamic balance by stretching and strengthening. Balance training is aimed at improving the vestibular system, or body balance. Balance exercises are very useful for empowering the elderly to optimize their abilities and avoid the risk of falls. The purpose of this study was to determine the effect of body balance exercise on reducing the risk of falls in the elderly in Teluk Village in 2024. The research method used was a quasi-experimental design study with a One Group Pretest and Posttest design, using the Wilcoxon sign rank test. A sample of 32 respondents with a total sampling technique. The statistical test used was the Wilcoxon sign rank test. From the results of the statistical test, it was obtained p value = 0.000 (α = 0.05), thus p value < from α so that Ho is rejected. So it can be concluded that there is an influence of Balance Exercise (Balance Training) of the Body on Reducing the Risk of Falls in the Elderly in Teluk Village.

Keywords*:* Balance Exercise, Risk of Falls, Ederly in Teluk Village

Siti Saodah[1]
[1]Nursing Profession, Universitas Putra Abadi Langkat, Indonesia
e-mail: sitisaodah1112@gmail.com[1]

Endam Apulina Br. Sembiring[2], dr. Ari Nugraha[3]
[2,3]Lecturer of Nursing Department, Universitas Putra Abadi Langkat, Indonesia
e-mail: sitisaodah1112@gmail.com[1]

Introduction

Elderly person is someone who has entered the final stages of life and is experiencing the aging process. A common problem in the elderly is a decline in the body's tissue function, characterized by weakness, limitations, and an inability to perform activities[1]. Health is influenced by many factors, including physical deterioration or changes in the musculoskeletal system, such as reduced muscle mass, stiff connective tissue, and osteoporosis. This can lead to decreased muscle strength, particularly in the lower extremities, physical endurance, and coordination, as well as limited mobility in older adults [2].

Fall is an unintentional event that can suddenly result in a person lying or sitting on the floor. Falls are more likely in older adults due to impaired balance and gait. Falls in the elderly can lead to complications such as fractures and even death. Falls are the most dangerous condition and have the second worst impact on seniors who experience injuries from falls. Balance and gait impairments are the most common causes of falls in older adults and often lead to injury, disability, loss of independence, and limited quality of life [3].

Falls are influenced by various factors, including intrinsic factors (aging, gait disturbances, lower extremity muscle weakness, joint strength, and syncope-dizziness), and extrinsic factors (slippery and uneven floors, tripping over objects, poor vision due to poor lighting) [4]. Prevention is the first step that must be taken, because if a fall occurs, complications can arise, even minor ones, which can be serious. Falls can be prevented by improving environmental conditions that are considered unsafe, identifying risk factors, assessing balance and gait, and providing balance training [5]. Balance exercises are a series of movements carried out to improve static and dynamic balance by providing strengthening and stretching.

Complications of falls that can occur in the elderly include post-fall anxiety syndrome, soft tissue injuries or fractures, hospitalization, disability (decreased mobility), decreased functional status or decreased independence, increased use of health facilities, and can even cause patient death [6]. The main preventive measures in managing the risk of falls aimed at preventing injuries early on are very important, so that the risk of injury and death can be avoided.

Literature Review

According to the literature, health status is influenced by many factors, including physical deterioration or changes in the musculoskeletal system, such as reduced muscle mass, stiff connective tissue, and osteoporosis. This can lead to decreased muscle strength, particularly in the lower extremities, physical endurance, and coordination, as well as limited mobility in the elderly [6]. Aging is a natural, unavoidable process. It is caused by biological factors and occurs continuously and sustainably. The aging process causes anatomical, physiological, and biochemical changes in body tissues, ultimately affecting the function and abilities of the body and mind. In older adults, systems such as the visual, nervous, and sensory systems that affect balance and balance decline [7].

Decreased use of the neuromuscular system is a major cause of muscle strength loss. Muscle damage occurs due to a reduction in the number of muscle fibers and general atrophy of the body's organs and tissues. Lower extremity muscle weakness can lead to decreased muscle strength in the elderly, which is a major factor in poor balance in the elderly. Muscle strength in the elderly decreases by 10-15% per week and up to 5.5% per day, with activity and complete rest [8].

This loss of balance puts the elderly at a very high risk of falling, which can lead to injury, reduced mobility, decreased independence, self-confidence and lifestyle changes and even death in the elderly [9]. A fall is an unintentional event that can suddenly result in a person lying or sitting on the floor. Falls are more likely in older adults due to impaired balance and gait. Falls in the elderly can lead to complications such as fractures and even death. Falls are the most dangerous condition and have the second worst impact on seniors who experience

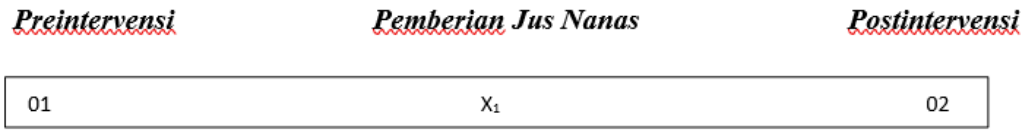
injuries from falls. Balance and gait impairments are the most common causes of falls in older adults and often lead to injury, disability, loss of independence, and limited quality of life [3].

Falls are influenced by various factors, including intrinsic factors (aging, gait disturbances, lower extremity muscle weakness, joint strength, and syncope-dizziness), and extrinsic factors (slippery and uneven floors, tripping over objects, poor vision due to poor lighting) [10]. Aging is a major cause of balance disorders in the elderly. One of these factors is changes in muscle structure, namely a reduction in the number and size of muscle fibers (muscle atrophy). If the musculoskeletal system is reduced, the calcium (Ca) released by the sarcoplasmic reticulum is not optimal, resulting in less than optimal tensile strength between actin and myosin and causing poor balance (wobbliness/inability to stand upright).

Prevention is the first step that must be taken, because if a fall occurs, complications can arise, even minor ones, which can be serious. Falls can be prevented by improving environmental conditions deemed unsafe, identifying risk factors, assessing balance and gait, and providing balance training [5]. Balance exercises are a series of movements performed to improve static and dynamic balance by stretching and strengthening [6]. Balance training is aimed at improving the vestibular system, or body balance. Balance exercises are very useful for empowering seniors to optimize their abilities and avoid the risk of falls [7].

Research Methodology

In this study, the researcher used a quasi-experimental research design, with a One Group Pretest and Posttest design, using the Wilcoxon signed rank test. This design uses a causal relationship by involving one group of subjects. This design does not have a comparison group (control) but a first observation (pretest) is carried out which allows researchers to test the changes that occur after treatment.



The instruments used by the researcher for the independent variables were reading books and standard operating procedures (SOP) on balance exercises. For the dependent variable, the researcher used an observation sheet containing the respondents' demographic data, including their initials and age. The balance measurement results were recorded on the observation sheet. Before administering the balance exercise intervention to the elderly, an observation was conducted to determine their balance score. This observation was conducted on the first day. After the initial observation and obtaining the results, a balance exercise intervention was conducted on the elderly using a wooden chair. This exercise was performed twice a week for one month, or six sessions, and a process evaluation was also conducted at the end of the therapy. At the end of the process, another observation was conducted to determine changes in the elderly's balance score.

Results

From 32 respondents, the average fall risk score of respondents before the balance exercise intervention was 36.00, with a standard deviation of 5.853. While the average fall risk score of respondents after the balance exercise intervention was 38.00, with a standard deviation of 5.558. Thus, there was a difference in the average fall risk score of respondents before and after the intervention. The results of the Wilcoxon sign rank test obtained a p value = 0.000 ($<\alpha$ 0.05) which means that the provision of balance exercise has an effect on reducing the risk of falls in the elderly.

Measurements were conducted using a Berg Balance Scale observation sheet during the first meeting with the respondents, followed by balance exercises. To determine changes in postural balance scores before and after balance exercises, a Berg Balance Scale observation sheet was used on the respondents. After all data had been collected from all respondents,

analysis was conducted using a computer statistical program. The results of the normality test showed that the data were not normally distributed. Therefore, the researchers used the Wilcoxon signed-rank test.

Research conducted by 32 respondents found that there was a difference in postural balance values before and after the intervention. The results of the Wilcoxon sign rank test obtained the results of the analysis of the p value = 0.000, where the calculated p value <0.05 which means Ha is accepted or there is a significant influence between Balance Exercise on reducing the risk of falls in the elderly. Statistically, it shows that there is a significant influence between Balance Exercise on Postural Balance in the elderly with a p value = 0.000 and OR = 3.2 which means an increase in postural balance 3.2 times compared to respondents who did not receive balance exercise intervention.

A study by Maixnerova et al. (2022) on elderly people in the United States showed a significant difference (5%) between the control group and the group not given balance exercises. The group without balance exercises experienced improved balance and an increased risk of falls. Good postural balance can improve the ability of older adults to prevent falls. These exercises aim to improve postural balance, but the elderly's readiness to follow each procedure must be considered. Balance training is crucial for the elderly because it significantly helps maintain body stability. Research by Urs Granacher (2022) suggests that balance training performed over several weeks can induce muscle and muscle fiber contractions in older adults. This occurs due to an increase in the phosphagen metabolic system, including ATP and phosphocreatine. Therefore, this increased muscle strength can improve postural balance in older adults, thereby preventing the risk of falls.

Balance exercise has been developed into a comprehensive program designed specifically for stimulating the vestibular system, potentially improving physical function. This program can be an effective way to prevent falls in the elderly. Balance exercise is useful for empowering seniors to optimize their abilities and avoid the impacts of disabilities. The brain, muscles, and bones work together to maintain body balance and prevent falls in the elderly (Rogers, 2021). The three-week study encountered several obstacles. The first was respondents' refusal to participate in the intervention due to a lack of knowledge about the importance of balance exercise. This was also due to the elderly's lack of activity. However, this obstacle was overcome by providing information about the purpose and benefits of balance exercise, which ultimately led to a willingness and interest in participating in the exercise, as it increased activity and improved health.

The second obstacle the researchers encountered during the intervention was that elderly people still experienced difficulty performing procedures such as moving from a chair to standing. Therefore, it is hoped that future researchers can develop balance exercise research by modifying movements from other references to make it easier for elderly people to follow. They also hope to add a control group to obtain more accurate balance scores by comparing balance scores before and after the study. The researchers also assume that through regular exercise, elderly people will experience increased confidence in movement and activities, as well as a reduced fear of falling, a psychological factor that triggers falls.

Conclusion

Research shows that balance training is significantly effective in reducing the risk of falls in the elderly. Structured, regular training tailored to the elderly's physical abilities has been shown to:

1. Improve postural stability, both in static and dynamic positions.
2. Improve lower extremity muscle strength, which is a crucial component for maintaining balance.
3. Improve seniors' confidence in performing daily activities, thereby reducing anxiety about falling.

4. Reduce fall risk scores based on measurement tools such as the TUG (Timed Up and Go), Berg Balance Scale, or EFRST.

Therefore, balance training is recommended as a preventive nursing intervention that can be implemented in community settings, nursing homes, and healthcare facilities to improve the quality of life and safety of the elderly.

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