# THE EFFECT OF GIVING BALANCE EXERCISE ON THE DYNAMIC BALANCE OF THE ELDERLY

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***ABSTRACT***
***Introduction:*** *The United Nation defines the elderly as those aged 60 years or more. As people get older, they will experience a decline in many abilities, one of which is balance. The intervention carried out to improve the dynamic balance of the elderly is Balance Exercise.* ***Research Method:*** *This research used a Quasi Experiment with a Two Group Pre – Posttest Design which was carried out at the PSTW Budi Mulia I Cipayung. The sampling technique was carried out using Purposive Sampling with a total sample of 22 people, 11 people in the treatment group were given Education and Balance Exercise and 11 people in the control group were only given education. This research was carried out 3 times a week for 4 weeks. In both groups, dynamic balance was measured using the Timed Up and Go Test before and after the intervention.* ***Results:*** *The difference test carried out using the Independent Sample T-Test resulted in a p-value of 0.000, which means there is a significant difference in the two groups.* ***Conclusion:*** *Balance exercise has a significant effect on increasing the dynamic balance of elderly people compared to elderly people who were only given education*
***Keywords****: Elderly; Dynamic Balance; Balance Exercise.*

**INTRODUCTION ( 12 pt)**

According to the Ministry of Health of the Republic of Indonesia, an elderly person is someone who has reached the age of 60 years or above (Permenkes, 2016). In 2024, it is estimated that the number of people aged over 65 years will exceed the number of people aged under 15 years in Europe. This trend means new challenges in the social, economic and health sectors, which require a focus on healthy elderly people to overcome the impacts of an aging population (WHO, 2023).

In the last fifty years, the percentage of the elderly population in Indonesia in 1971 was 4.5 percent and increased in 2020 to around 10.7 percent. This figure is projected to continue to increase until 2045 reaching 19.9 percent. Based on statistical data from BPS in 2021, the proportion of elderly people is around 29.3 million people or 10.82 percent (Statistic, 2021).

In Indonesia, the prevalence of fall injuries in people over 55 years of age reached 49.4%, and 67.1% for people over 65 years of age. Falls are reported to occur in around 30% of elderly people aged 65 years and over who live at home (in the community), half of this number experience repeated falls. Elderly people who live at home experience falls around 50% and require hospital treatment around 10-25% (Fristantia, 2018).

In general, elderly people have a decrease in muscle strength, joint flexibility and balance. As people get older, they will experience a decline in many abilities, one of them is balance (Salem et al., 2014).

Balance is defined as the ability to control the body's center of mass or center of gravity relative to the base of support (Suadnyana et al., 2019). Balance is divided into two, namely static and dynamic balance. Static balance maintains a position that does not move or change while dynamic balance involves body control as the body moves in space (Afafah, 2018).

Balance factors in the elderly are caused by a decrease in physical activity and muscle strength. In addition, with increasing age, physiological functions decrease due to degenerative processes (aging) so that non-communicable diseases often appear in the elderly. Then, degenerative problems reduce the body's resistance, making it susceptible to infection (Ibrahim et al., 2018).

Balance is divided into two, namely static balance is the body's ability to maintain the center of mass, center of gravity in the base of support when motionless, while dynamic balance is the body's ability to maintain the center of mass, center of gravity in the base of support when movingn(Sari et al., 2022).

Physiotherapy is a form of health service aimed at individuals and/or groups to develop, maintain and restore body movement and function throughout the life span by using manual treatment, movement enhancement, equipment (physical, electrotherapeutic and mechanical), functional

training, and communication (Health Ministry of Republic of Indonesia, 2015). The role of physiotherapy in preventing balance disorders in the elderly is giving exercise, which is Balance Exercise.

When performing Balance Exercises, sensory information is sent via mechanoreceptors regarding changes in body position from the joints to the nervous system. The information is then processed by the anterior motor neurons into action potentials that spread along the muscle membrane, resulting in muscle contractions. Then these muscles will support the body and stabilize the body to maintain its balance (Nugraha et al., 2016).

Panti Sosial Tresna Werdha 1 (PSTW) was chosen as the research location, because after conducting interviews with the head of the home and the head of nurse, the researchers found that the number of elderly people at PSTW Budi Mulia I was 250 people with 91 men and 159 women, with a total of 14 guest houses and divided into 7 rooms. There are various categories of elderly, including independent elderly, elderly with mental disorders, total care elderly, semi-total care elderly, and elderly with infectious diseases and this research has never been carried out, so researchers are interested in conducting research with the title "The Effect of Giving Balance Exercise on Balance Dynamics of the Elderly at PSTW Budi Mulia 1 Cipayung".

Considering the high elderly population accompanied by balance disorders, it is hoped that this research can determine the effect of providing Balance Exercise as an alternative balance exercise for the elderly at PSTW Budi Mulia 1 Cipayung.

**METHOD (12 pt)**

The research method uses quantitative methods with a Quasi Experimental research design with a two group pretest posttest method. The population taken in this study were elderly people who lived at the Tresna Werdha Social Home (PSTW) Budi Mulia 1 Cipayung with a total sample of 22 people, 11 people in each treatment and control group. The independent variable in this research is Balance Exercise and the research variable is the dynamic balance of the elderly.

This research was held from January to May 2024, 3 times a week for 4 weeks. Starting with obtaining a permit and introductory letter from the study program to the DKI Jakarta Provincial Social Service. After obtaining permission, then determine the sample inclusion criteria to determine respondents who are suitable for the research process. After that, the population and sampling method are determined. Then, prepare equipment to carry out the examination such as research instruments, explanation of the exercise program, informed consent, stopwatch, and a

chair with a backrest for carrying out the Timed Up and Go Test. This test is a measuring tool to assess dynamic balance in the elderly. followed by a pre-test examination, giving intervention and education and at the end of the meeting a post-test examination was carried out.

The research data that has been collected is processed in SPSS. The analysis used is univariate analysis, carried out to describe the characteristics of each research variable, namely in the form of demographic data such as age (mean, minimum and maximum), gender (frequency distribution), and balance level values (mean and standard deviation) before and after being given intervention. After that, bivariate analysis was carried out with a normality test using the Shapiro Wilk test, followed by the Paired Sample T-Test, and ending using the Independent T-Test. This research has received ethical approval from the Semarang State University Health Research Ethics Committee with Letter Number: 026/KEPK/FK/KLE/2024 on January 29, 2024.

## RESULTS AND DISCUSSION

1. Univariate Analysis

a. Age

Based on the table below, it shows that the ages of respondents in the treatment group were dominated by 70 years and over, 7 people with a percentage of 63.6% and the fewest respondents in the 60-69 year age range were only 4 people with a percentage of 36.4% with an average age of 70,27 years and a minimum value of 60 years and a maximum of 80 years. The table above also shows that the age of respondents in the control group was dominated by 8 people aged 60-69 years with a percentage of 63.6% and the least respondents aged 70 years and over were 3 people with a percentage of 36.4% with an average age of 66,00 years and a minimum value of 60 years and a maximum of 75 years.

Table 1. Frequency Distribution Table Based on Age in the Elderly

| | **Usia** | ***Balance Exercise*** | | | | |
|---|---|---|---|---|---|---|
| | | **F** | **P (%)** | **Mean** | **Median** | **Min-Max** |
| **Intervention Group** | 60-69 | 4 | 36,4% | 70,27 | 71,00 | 60 – 80 |
| | >70 | 7 | 63,6% | | | |
| | Total | 11 | 100% | | | |
| **Control Group** | 60-69 | 8 | 72,7% | 66,00 | 67,00 | 60 – 75 |
| | >70 | 3 | 27,3% | | | |
| | Total | 11 | 100% | | | |

b. Gender

Based on the table below, the distribution of respondents based on gender in both the treatment group and the control group shows a percentage of 63.6% for women with a total of 7 people and 36.4% for men with a total of 4 people.

Table 2. Gender Frequency Distribution Table in the Elderly

| | **Jenis Kelamin** | **Frekuensi** | **Persentase (%)** |
|---|---|---|---|
| **Intervention Group** | Perempuan | 7 | 63,6% |
| | Laki-laki | 4 | 36,4% |
| | Total | 11 | 100% |
| | **Jenis Kelamin** | **Frekuensi** | **Persentase (%)** |
| **Control Group** | Perempuan | 7 | 63,6% |
| | Laki-laki | 4 | 36,4% |
| | Total | 11 | 100% |

c. Dynamic balance of the elderly before and after intervention

Based on the results table, the average dynamic balance in the treatment group increased after the intervention, from 25.35 to 21.97 with a standard deviation before the intervention of 5.52 and after the intervention of 5.47. Meanwhile, the median value before the intervention was 24.73 and after the intervention the value was 22.84, and the minimum and maximum values before treatment were 16.84-32.83 and the minimum and maximum values after treatment were 13.93-22.84.

Meanwhile, the average dynamic balance results in the treatment group increased after the intervention, from 24.46 to 22.88 with a standard deviation before the intervention of 8.08 and after the intervention of 8.31. Meanwhile, the median value before the intervention was 21.43 and after the intervention the value was 19.22, and the minimum and maximum values before treatment were 15.64-38.74 and the minimum and maximum values after treatment were 13.73-37.63.

Table 3. Dynamic Balance Measurement Results Before and After Intervention in the Elderly

| | **Mean ± SD** | **Median** | **Min** | **Max** |
|---|---|---|---|---|



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| | | | | | |
|---|---|---|---|---|---|
| **Intervention Group** | Before | 25,35 ± 5,52 | 24,73 | 16,84 | 32,84 |
| | After | 21,97 ± 5,47 | 22,84 | 13,93 | 22,84 |
| | Difference | 3,37±0,74 | 3,11 | 1,89 | 4,45 |
| **Control Group** | Before | 24,46 ± 8,08 | 21,43 | 15,64 | 38,74 |
| | After | 22,88 ± 8,31 | 19,22 | 13,73 | 37,63 |
| | Difference | 1,57±0,65 | 1,86 | 0,41 | 2,60 |

2. Bivariat Analysis

a. Data Normality Test

Based on the results of the normality test in the table, it can be seen that the dynamic balance for the Intervention group before the intervention was 0.474 and after the intervention 0.535, which has a p value > 0.05, so it can be said that the data is normally distributed, so the difference between the intervention group is also normally distributed.

Furthermore, in the control group it was found that before being given education it was 0.015 and after being given education it was 0.012 which had a p value <0.05, so the data was abnormal distributed, while for the difference in the control group it was normally distributed.

Table 4. Table of Normality Test Results of the Shapiro Wilk Test for Intervention Group and Control Group on the Dynamic Balance of the Elderly

| **Kelompok** | **Hasil** | **Mean ± SD** | **p** | **Ket** |
|---|---|---|---|---|
| Intervention Group | Before | 24,46 ± 8,08 | 0,474 | Normal |
| | After | 22,88 ± 8,31 | 0,535 | Normal |
| | Difference | | 0,123 | Normal |
| Control Group | Before | 25,35 ± 5,52 | 0,015 | Abnormal |
| | After | 21,97 ± 5,47 | 0,012 | Abnormal |
| | Difference | | 0,639 | Normal |

b. Hypothesis Test

Next, to determine the results of improving dynamic balance in the intervention group with normally distributed data, a Paired Sample T-Test was carried out.

In the table based on the Paired Sample T Test for the treatment group, a p value of 0.000 was obtained, which is p<0.05, so it can be concluded that there is a significant influence

between before and after the balance exercise intervention was given on the dynamic balance of the elderly.

Next, test the hypothesis with non-normally distributed data, namely the Wilcoxon Test, which aims to determine whether or not there is an effect of providing education in the control group on dynamic balance before and after. In table 4.7, based on the Wilcoxon Test in the control group, a p value of 0.003 was obtained, which is $p<0.05$, so it can be concluded that there is a significant influence between before and after being given education on the dynamic balance of the elderly.

Table 5. Hypothesis Test Results for the Treatment Group and Control Group on the Dynamic Balance of the Elderly

| **Uji Hipotesis** | **p value** | **ket** |
|---|---|---|
| *Paired Sample T-Test* (Intervention Group) | 0,000 | significant |
| *Wilcoxon* (Control Group) | 0,003 | significant |

c. Independent Sample T-Test

The next hypothesis test uses the Independent sample T Test. This test uses data from the Pre-Post test difference for each group after being given the intervention. This test was carried out to determine the differences between two independent samples, in this case the treatment group using Balance Exercise and the control group using education.

Based on the table below showing the results for dynamic balance in both groups, a p value of 0.000 was obtained, so it can be concluded from the test results that the p value is > 0.05, which means there is a significant difference between the treatment group and the control group. Therefore, a conclusion can be drawn, namely that Balance Exercise and education have a significant influence on improving the dynamic balance of the elderly.

Table 6. Independent T-Test Test Results for Treatment Groups and Control Group on the Dynamic Balance of the Elderly

| Difference Before - After | Mean | p | Explanation |
|---|---|---|---|
| Education | 1,57 | | There are differentiation effect |
| Education and *Balance Exercise* | 3,37 | 0,000 | |



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## CONCLUSION

Based on the results of the research and statistical tests carried out in this research, it can be concluded that there is a difference in effect between the two groups, which means that Balance Exercise and education are more effective in improving the dynamic balance of elderly people compared to elderly people who were only given education.


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