

THE EFFECTS OF 12 BALANCE EXERCISES IN IMPROVING DYNAMIC BALANCE AMONG ELDERLY

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ABSTRACT

Background: Balance is the dynamic process of maintaining body balance. Decline balance in the elderly would influence the rising in fall risk. Physiological changes in the elderly are caused by aging, and balance impairment is included in it. Balance impairment in the elderly affects the increase in fall risk. Twelve balance exercise is one of the balance exercises which is an effective-exercises that improve balance. It optimized the sensory interaction between system visual, vestibular, and somatosensoris and decrease the fall risk in the elderly. The purpose of this study was to find the differences in results before and after doing 12 balance exercises against the berg balance scale in Bhakti Luhur Nursing Home Waru Sidoarjo.

Method: This study was an experimental study with pre and post-test group design. Purposive sampling was used for obtaining 17 responses. Every subject did 12 balance exercises three times a week in 4 weeks period. Data was collected by measuring balance among the elderly people using Berg Balance Scale before and after exercise in each subject. We analyzed data using EZR (Easy R) to find out the result.

Result: Data Analysis was done on 16 subjects because one subject dropped out. The average results in pre-test and post-test are 45,87 and 52,75. Normality data was tested using Shapiro Wilk Test which the conclusion was data distributed normally. Paired t-test result showed significant with $p < 0,05$ which means there was an increasing balance significantly.

Conclusion: 12 balance exercises can increase balance and reduce fall risk in the elderly.

Keywords: Balance; Elderly; Exercise; Fall risk.

INTRODUCTION

The World Health Organization (WHO) states, the limitations of the elderly include middle age, elderly, old age, and very old age. Based on population projection data, it is estimated that in 2017 there were 23.66 million elderly people in Indonesia (9.03%). It is predicted

that the number of elderly people in 2020 (27.08 million), in 2025 (33.69 million), in 2030 (40.95 million) and in 2035 (48.19 million). Indonesia will rank 6th in the world and exceed the number of elderly people in Brazil, Mexico, and European countries (Kemenkes RI., 2017 and WHO., 2014).

Balance is a general term used to describe the dynamic process of the body maintaining its position in a state of equilibrium. Balanced means that the body can maintain its position when at rest (static balance) or when moving (dynamic balance) (Kisner & Colby., 2013). The physiological decline that occurs in the elderly affects the movement system and balance control such as decreased muscle strength, changes in posture, fat levels that accumulate in certain areas, proprioceptive and audiovisual decline. Poor balance in the elderly is caused by a physiological decline in the body due to aging, so it can increase the risk of falling in the elderly. Disorders of balance and gait and weakness of lower extremity muscles cause fall in the elderly (Shobha, 2005).

When the muscles that play a role in body balance work together to form a force that aims to maintain body position in accordance with a symmetrical body alignment so that it becomes more stable when moved or used when moving. The motion produced when the body has the ability to stabilize is an effective and efficient motion that can reduce the risk of falling (Munawwarah et al., 2015).

KEPMENKES 1363 of 2008 Chapter I, article 1 paragraph 2: "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 handling, increased movement, equipment (physical, electrotherapeutic, and mechanical), function and communication training. Physiotherapy in this case plays a very important role in improving movement and function, especially in the elderly so that the quality of life of the elderly will be better and they can enjoy their life without requiring full assistance from others and get any injuries, as well as improving functional abilities (Munawwarah et al., 2015).

One of the roles of physiotherapy in the elderly is to train to increase movement related to balance, so the authors are interested in taking the title of balance exercises in the elderly. Physiotherapy actions that can be given are single-limb stance balance exercises, eye tracking, clock reach, tandem stance, single limb stance with arm, balancing wand, knee

marching, body circle, heel to toe, grapevine, stepping exercise, dynamic walking (Nugraha et al., 2016).

METHODOLOGY

This research is an experimental study and uses a one-group pre-test and post-test design. This study aims to determine the basic value of the difference before and after giving an exercise program of 12 kinds of balance which is stated in the Berg Balance Scale index.

The study was approved by the research ethical commission Dental Medicine Faculty, Airlangga University (078/HRECC.FODM/III/2019). This study used purposive sampling, by choosing merely subjects who were appropriate within inclusion criteria. Inclusion Criteria: Elderly 60-74 years old, Normal BMI, Elderly with 60-80 score in Barthel Index. Exclusion Criteria: Parkinson, Stroke, Eye Problem, Polio, Ear Problem, Fracture on Lower Extremity.

RESULTS

Demographic Data

The subjects consisted of the elderly at the Bhakti Luhur Waru Nursing Home - Sidoarjo. Subjects in this study amounted to 17. During the study, there was 1 research subject who dropped out because he only participated in 3 exercises, so the number of subjects who followed until the end of the study was 16 people. The following data were obtained:

Table 1.0: Demographic Data

	N	Min	Max	Rata – Rata
Age	16	60	82	64,87 ± 5,94
Weight (kg)	16	40	69	52,24 ± 9,27
Height (kg)	16	1,32	1,63	1,47 ± 0,08
BMI (kg/m ²)	16	18,51	29,49	23,91 ± 3,52

BMI= Body Mass Index

A total of 16 subjects with an average weight of 52.24 kg and a height of 1.47 m (mean BMI 0.08 kg/m²). The data showed that the subjects met the inclusion criteria with an average age of 64.87 years.

Data Analysis

Table 2.0: Pre and Post-Test Results

	N	Min	Max	Rata – Rata
Pre-test BBS	16	34	54	45,87 ± 5,63
Post-test BBS	16	47	56	52,75 ± 2,65

Balance checks with the Berg Balance Scale (BBS) were carried out before and after being given 12 kinds of balance exercises on the research subjects. The average results of the BBS pre-test were 45.87 and the BBS post-test were 52.75.

Table 4.0: Paired T-test

	<i>Pre test</i>	<i>Post test</i>	Nilai p
Balance	45,87 ± 5,63	52,75 ± 2,65	4,094e-06

The table above shows that the results of $p = 4.094$ where the p value < 0.05 (95% CI -8.96 -4.78) stated that H1 was accepted, which means that there was a significant increase in research subjects after being given 12 kinds of balance exercises.

DISCUSSION

Balance checks were carried out using the Berg Balance Scale (BBS). The average result of the BBS pre-test, which is 45.87 ± 5.63 , which indicates there is a decrease in balance in the research subjects from the normal value of BBS 56. After being given exercise 3 times a week for 4 weeks, the average BBS post test results obtained, which is 52.75 ± 2.65 . These results indicate an increase in the balance of the research subjects.

The training of 12 balance exercises activates the feedforward mechanism in movement strategies and improves sensory strategies in the form of sensory integration and sensory re-weighting. The vestibulo-cerebellar system is useful for regulating the balance between the contraction of agonist and antagonist muscles in the back, pelvis, and shoulders when the body position changes rapidly as required by the vestibular apparatus. The feedforward mechanism is active when the body maintains balance for attitude correction needed when maintaining balance during rapid movements or changes (Nugraha et al, 2016).

Nugraha et al stated that 12 balance exercises are more effective than balance strategy exercises in improving dynamic balance among the elderly as sensory integration happened during 12 balance exercises through eye-tracking, dynamic walking, and stepping exercise.

Doing eye-tracking and stepping exercises activates the vestibulo-ocular reflex. Stepping exercise training also causes excitation of the vestibular apparatus in this case the semicircular canals, and dynamic walking provides additional information on the somatosensory body, thus the concept of sensory integration is achieved in terms of maintaining dynamic balance, namely: integration between the visual, vestibular, and somatosensory systems. Optimizing the function of sensory integration as well as sensory re-weighting in training using obstacles during dynamic walking provides adaptations to the sensory system to share this information by increasing sensory abilities for vestibular and visual information and reducing dependence on somatosensory input for postural orientation (Nugraha et al., 2016).

CONCLUSION

The limitations of this study are the lack of supporting assistants due to the remote location of the study and the short implementation time because they only get permission to do research in the afternoon. The unstable condition of the elderly also hindered the implementation of this study. In this study, there was 1 subject who dropped out because he only participated in 3 exercises, but the remaining number of subjects still met the specified minimum sample size.

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