# HEALTH PROMOTION AND ELDERLY EXERCISE TO IMPROVE KNOWLEDGE AND BALANCE IN THE ELDERLY

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## ABSTRACT

**Background:** Elderly is a natural process in humans, where physiological abilities will decrease. Falls are a problem that often arises in the elderly as a result of a decrease in balance. By providing elderly exercise is expected to reduce the risk of falling in the elderly. This study aimed to determine the effect of health promotion and elderly exercise for knowledge and balance among the elderly.

**Subjects and Method:** This was a cross-sectional study with pre and post-test one group design conducted in Pucang Sawit, Surakarta, Central Java, in August 2021. A total of 50 elderly was selected by random sampling. The dependent variables were knowledge and balance. The independent variables were health promotion and elderly exercise. The data were collected by Berg Balance Scale (BBS) and analyzed by Wilcoxon.

**Results:** Knowledge of the elderly was higher after intervention (Mean= 368; SD= 7.41) than before (Mean= 242; SD=4.95) and it was statistically significant (p< 0.001). Balance in the elderly after intervention (Mean= 41.78; SD= 1.31) was higher than before (Mean= 36.29; SD= 1.38) and it was statistically significant (p< 0.001).

**Conclusion:** Health promotion and elderly exercise intervention increases knowledge and balance among the elderly.

**Keywords:** health promotion, elderly exercise, balance, elderly

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## BACKGROUND

The aging process will have an impact on various aspects of life, getting old is a process of slowly disappearing the ability of tissues to repair themselves or replace and maintain their normal functions so that they cannot survive infection and are unable to repair the damage suffered (Azizah, 2011).

Biologically elderly will experience the aging process continuously, marked by decreased resistance so that they are vulnerable to health problems and disease attacks that can cause death. A health problem is the condition of a person experiencing physical or psychological health problems, such as falls due to anxiety and balance disorders (Ministry of Health, 2017).

Falls are a major cause of morbidity, mortality, and reduced function (Kisner and Colby, 2017). A fall is an unconscious event, where a person falls from a higher place to a lower place which can be caused by a loss of consciousness (Sabatini et al., 2015). Many factors play a role in it, extrinsic factors such as slippery and uneven floors, tripping by objects, excessive or insufficient lighting so that vision becomes less than optimal. While intrinsic factors are obtained from within, both physically and psychologically, in terms of physical aspects such as walking disorders, lower extremity

muscle weakness, joint stiffness, balance disorders, and for psychological aspects one of them is anxiety (Erda, 2013).

Balance disorders are defined as decreased postural control which causes balance disorders so that it can increase the risk of falling which has an impact on the occurrence of lesions in the lower extremities (Onofrei et al., 2019).

Prevention of falls can be done by maximizing the body's balance ability, and helping to reduce and control the level of anxiety caused by other factors where anxiety can affect the incidence of falls, therefore physiotherapy plays a role in health programs, namely in the form of prevention by providing exercise at an early age pre-elderly where the main focus in dealing with falling problems is to improve and maintain body balance and reduce and control anxiety starting from pre-elderly age (Vafaeenasab et al., 2018)

Balance training is a series of movements to improve through stretching, strengthening (Kloos and Heiss, 2007). The exercise helps the brain adjust to changes in the signal (re-calibrate) so that the brain will automatically adapt, this process is called central compensation (Berkshire, 2008). From this background, the authors wanted to know the effect of counseling and exercise for the elderly on the knowledge and balance of the elderly in Pucang Sawit Village.

## SUBJECTS AND METHOD

### 1. Study Design
This was quasi experimental study with, one group pre-test and post-test design conducted in Pucang Sawit Village, in August 2021.

### 2. Population and Sample
The population in this study were elderly in Pucang Sawit Village. A total of 50 elderly were selected for this study randomly.

### 3. Study Variables
The dependent variable were knowledge and balance. The independent variables were health promotion and elderly exercise.

### 4. Operational Definition of Variables
**Knowledge** is subject's perception of health promotion and elderly exercise.

**Balance** is the ability to maintain the body when placed in a variety of positions using minimal muscle activity as measured by the berg balance scale (BBC).

**Health promotion** are the efforts to increase the knowledge of the elderly on balance so that the elderly can avoid the risk of falling and can improve their balance.

**Elderly exercise** is a series of movements or physical exercises performed by the elderly to improve their functional abilities.

### 5. Instruments
The instruments used in this study were stopwatch, chair; books and stationery to record the measurement results, balance was measured using the berg balance scale (BBC).

### 6. Data Analysis
The data were collected using instrument tools measured namely the berg balance scale (BBC), and data were analyzed using Wilcoxon sign rank test.

## RESULTS

The subjects in this study numbered 50 elderly. The effect of health promotion and elderly exercise for knowledge and balance among the elderly it can be seen on the table 1 and table 2.

**Table 1. Knowledge on the elderly before and after intervention**

| Variables | Mean | SD | p |
|---|---|---|---|
| **Knowledge** | | | |
| Before intervention | 242 | 4.95 | <0.001 |
| After intervention | 368 | 7.41 | |

Table 1 showed knowledge of the elderly was higher after intervention (Mean= 368; SD= 7.41) than before (Mean= 242; SD=4.95) and it was statistically significant (p< 0.001).

**Table 2. Balance on the elderly before and after intervention.**

| Variables | Mean | SD | p |
|---|---|---|---|
| **Balance** | | | |
| Before intervention | 36.29 | 1.38 | <0.001 |
| After intervention | 41.78 | 1.31 | |

Table 2 showed balance in the elderly after intervention (Mean= 41.78; SD= 1.31) was higher than before (Mean= 36.29; SD= 1.38) and it was statistically significant (p< 0.001).

## DISCUSSION

In old age there is a decline in the performance of the balance integration system which includes the sensory system (visual, vestibular, and somatosensory), the central nervous system, and the motor (musculoskeletal) system. The sensory system provides information about the body's position with respect to the environment, the central nervous system processes information obtained from the sensory, and the motor system acts as an effector of the information that has been received. The decrease in the performance of the system due to the degenerative process in the elderly causes a decrease in balance. Degenerative processes in the sensory system occur in the visual, vestibular and somatosensory systems.

According to O'Sullivan (1981), balance is the ability to maintain the center of gravity on the support plane, especially when in an upright position. In addition, according to Ann Thomson, balance is the ability to maintain the body in an equilibrium position or in a static or dynamic state, and use minimal muscle activity. Balance or postural stabilization is a term used to describe the dynamic process when the body position is maintained in equilibrium. Equilibrium is when the body is at rest (static equilibrium) or in steady motion (dynamic equilibrium). The best balance is when the body's center of mass (COM) or center of gravity (COG) is maintained above the base of support or BOS (Kisner and Colby, 2017).

Movements of the knee extensors, knee flexors, hip abductors, ankle plantar flexors, ankle dorso flexors, knee bends, one leg stands and standing asanas, if performed, muscle contractions will occur starting from the action potential from nerve cells to

muscle fibers then nerve cells release neurotransmitters. It travels through the neuromuscular junction and binds to receptors in the sarcolemma. Then the Na+ channel opens and membrane depolarization occurs so that the action potential travels towards the sarcoplasmic reticulum causing the release of Ca2+, Ca2+ will bind to troponin so that tropomyosin shifts and there is a shortening of the H zone. pull actin towards the M line in the middle of the sarcormer by requiring energy in the form of ATP, then the myosin bonds are released and the myosin heads will bind to actin and shift it back, this cycle will run continuously as long as Ca2+ and ATP are still available (Sherwood, 2015).

Then there is a change in the form of an increase in nerve work in the muscles, synchronization of the activetion of motor unit recruitment through the mechanism of muscle contraction in these movements a natural adaptation occurs which causes an increase in the strength of the gastrocnemius, hamstring, soleus muscles, extensor muscles of the trunk, tibialis anterior, quadriceps, and abdominal muscles (Kiranadi, 2017).

The balance of the body's postural response is achieved when doing exercises with tandem stance, tandem walk, heel walking, toe walk, heel walking backward, sit to stand, and standing asana movements. When carrying out this exercise, the linear acceleration of the body will be detected by the sensory organ of the macula utriculus, which plays an important role in determining the orientation of the upright position of the head. In the macula utriculus there are thousands of hair cells whose

origins synapse with the sensory endings of the vestibular nerve.

Dynamic control related to gait and locomotion is obtained through exercises for backward walking, walking and turning around, sideways walking. Dynamic control is obtained by activating and increasing the strength of the muscles used when stepping, including the pelvic muscles, namely extensors, flexors, abductors, adductors, rotators, quadriceps, hamstrings, muscles in the ankles. This exercise activates balance control, extension and contraction of lower extremity muscles and ankle dorsiflexion to move the body's center of gravity to control afferent, efferent and contraction of muscles in the lower extremities. The results of these exercises make body coordination better and the body can learn to move the body's center of gravity during steps so that there will be an increase in walking speed and stride length (Negara et al., 2020).

Almarzouki et al. (2020) shows that a home exercise program carried out 3 times a week can improve dynamic balance through strengthening lower extremity muscles and increasing proprioceptive, muscle groups in the hip and ankle responsible for correcting balance errors. Elderly gymnastics can increase the plasticity of the central nervous system and improve the function of the balance feedback loop. Research conducted by Jahanpeyma et al., (2020) stated that elderly gymnastics can improve balance and reduce the risk of falling.

The activities carried out on counseling about the risk of falling in the elderly and providing elderly exercise interventions can be concluded that there

is an achievement of the expected outcomes by the researchers seen from the pre-test and post-test values of the knowledge of the elderly about the risk of falling in the elderly. In addition to increasing knowledge in the elderly, there was also an increase in balance after being given an elderly exercise intervention.

## AUTHOR CONTRIBUTION

Rina Sri Widayati, Dita Mirawati, Dewi Kartika Sari are the main researchers who choose topics, conduct research, analyze data and compile published articles.

## CONFLICT OF INTEREST

There is no conflict of interest in this study.

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