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Original Research Article

The Correlation Between Physical Activities and Balance Level in Elderly at Serengan Public Health Center

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ABSTRACT

Introduction. This study aimed to know the relationship between low physical activity and balance in elderly. **Methods**. This type of research is a descriptive correlative study between low physical activity and elderly balance that consisting of 37 elderlies in the work area of Serengan Public Health Center based on purposive sampling technique. The examination of low physical activity is through Physical Activity Scale for Elderly (PASE). The questionnaire shows that mean ± SD value of low physical activity is 55.37 ± 18.99 and the balance measurement using Time Up and Go Test (TUGT) that obtained a mean ± SD balance of 18.14 ± 5.67. **Results & Analysis**. The Spearman-Rank Correlation Coefficient test obtained p value. **Discussion**. there is a relationship between physical activity and the risk of falling in elderly at Serengan. The lower or less physical activity the elderly does, the higher the risk of falling they have.

Keywords: **Balance Level, Elderly, Physical Activity**

INTRODUCTION

Elderly is an age group that occurs in a person and the final stage of life phase. Elderly are people who are over 60 years old who are experiencing the aging process (Pradnyanini, 2019). The distribution of elderly population in Surakarta based on Central Statistics Agency for Surakarta in 2021 are become 26,332 people. The elderly will experience an aging process that is a decrease cumulative transformation in every human being, such as body, system and cells. The aging in humans is associated with several changes such as musculoskeletal, cardiovascular, and nerves.

The elderly also experience changes in physiological functions in neurological system which cause a decrease in proprioceptive, vestibular, and visual. The elderly should increase positive physical activities and do not need strenuous activities, since positive physical activity will lead to a good quality of life (Palit, 2021).

In cardiovascular system, the changes are occurred in heart valves experience stiffness and a decrease in heart muscle contraction that reducing the heart's ability in pumping blood.

Also, the decrease in musculoskeletal system of synovial fluid, deficiency in strength and stability that caused kyphosis. The elderly will experience morphological changes in muscles that cause muscle functional changes, which cause a reduce in strength, elasticity and muscle flexibility resulting in a decrease in survive ability for postural and body balance.

Problems that are usually experienced by elderly are musculoskeletal disorders that affecting the balance control. In addition, the bones also lose fluid which causes bones weak, decreased bone capacity resulting in kyphosis, gait disturbances that causes scoliosis, sluggish movement due to atrophy of muscle fibers, tremors and reduced blood circulation in muscles. These changes result in sluggishness during activity or movement, and decreased muscle capacity in lower extremities. the feet are not strong enough to tread and balance disturbance that caused to fall easily. Balance is a complex interaction of sensory, vestibular, visual, and somatosensory systems including proprioceptors and musculoskeletal (muscles, joints, and other soft tissues) that are regulated in brain (motor control, sensory, basal ganglia, cerebellum, association area) as a response to changes in internal and external conditions (Yoga, 2019).

There are two levels in balance called static balance and dynamic balance. Static balance is a balance that maintains the body in a state of rest. An example of static balance is standing on one leg with the using a balance board (Arafah, 2018). Meanwhile, dynamic balance is the ability to maintain balance in moving conditions, like walking. When the balance in elderly body is not monitored, the problems that will arise in elderly's life quality, such as reduced self-confidence during activities due to worry about falling and other accidents, the occurrence of falls is the result of balance disorders. The method used to measure the elderly balance is TUGT or (time up and go test), which aims to detect the problems in dynamic balance of elderly with a view to measuring functional balance, ability, mobility, walking, and the risk of falling in 425 elderly. Along with the old age, a person will experience a condition of decreased function of body cells due to aging process which results in musculoskeletal weakness (Putri, 2019). The tools needed are chair with backrest and arm support, stopwatch, meter with 10 seconds – 3 minutes. The form of scale used is a nominal scale with two answer categories. For a value of 10 seconds, it shows variations in mobility and balance that has a high risk of falling or a positive TUG test. The balance disorders in elderly are required to practice physical activity, physical activity is all limb movements that need an energy such as activities at work, daily activities, physical activity is included in some factors that have a significant influence on the life quality.

Physical activity has 3 classifications called light, moderate, and heavy. In determining the elderly activity, it is necessary to measure through global physical activity questionnaire (GPAQ) in the form of questionnaire. The GPAQ has 16 questions including physical activity at work, physical activity of traveling from place to place and activities during leisure in assessing the participants' prevalence of physical activity. The activities that can affect the elderly balance, one of which is physical activity in the form of low impact aerobic exercise called gymnastics that use all muscles, especially large muscles that can stimulate the heart to the lungs. The movement is in the form of feet placed to the floor and accompanied by music that can increase and maintain the muscle strength for the better balance in elderly body.

The 80 elderly in this community are conducted the physical activities routinely in the form of things that keep them active and empower to live healthy and independent lives. This physical activity is conducted twice a week with an intensity of 30 minutes. Tera gymnastics is a breathing exercise that has a functions as therapy and causes a process where HPA axis stimulates the pineal gland to secrete serotonin and melatonin, then the stimulation from hypothalamus will be forwarded to anterior pituitary to form beta endorphins and encephalin. The ederly gymnastics called low impact aerobics includes stretching exercises which increase the muscles and tissues' elasticity and length around the joints in increasing flexibility (Putri *et al.*, 2020). After the emergence of beta endorphins during activities, people will get the advantages such as the feeling of happiness, joy, improve the sleep quality and keep the mind fresh.

METHOD AND ANALYSIS

This research is a quantitative descriptive to determine the relationship between low physical activity and balance in elderly. The population in this research were men and women who aged over 60 years. The research data sample amounted to 37 people based on research requirements. This study used an analytic observational research design using a cross sectional approach. The cross sectional approach is a type of research that emphasizes the measurement time or data observation of independent and dependent variables only once at a time. The cross sectional design is easier, more efficient in time and this research is a non-experimental research, to determine the relationship between independent variable (physical activity) and dependent variable (balance) in elderly. The result show that most of the respondent are female with the age of more than 60 years old, graduated from elementary and junior high school with no fall history.

RESULTS

Table 1. Samples' Distribution Based on Gender

Samples' distribution based on gender	Frequency	%
Male	15	41
Female	22	59
Total	**37**	**100**

Source: Personal Data

In table 1, the data distribution based on gender above shows that the frequency of female respondents is 22 people, or 59%. Meanwhile, male respondents are 22 respondents or 41%.

Table 2. Age Distribution Sample

Age	Frequency	%
60-65	10	41
66-70	15	27
71-75	6	16
76-80	3	8
>80	3	8
Total	**37**	**100**

Source: Personal Data

In table 2, the data distribution based on age above shows that the sample in this research has the lowest age of 60-65 with a percentage of 41% and the age >80 with a percentage of 8%.

Table 3. Data Distribution of Education Level

Educational background	Frequency	%
No school	3	8
Elementary School	11	30
Junior high school	11	30
Senior high school	10	27
College	3	5
Total	**37**	**100**

Source: Personal Data

In table 3, the data distribution based on education level above shows that the sample in this research are consisted of 3 people who did not go to school with a percentage of 8%, 11 elementary school graduates with a percentage of 30%, 11 junior high school graduates with a percentage of 30%, 10 high school graduates with a percentage of 30%. percentage of 27%, and 2 college graduates with a percentage of 5%.

Table 4. Data Distribution by History Of Falls In The Last Year

History of falls	Frequency	%
Never fall	24	65
Had fallen once	11	30
Had fallen twice	2	5
Total	**37**	**100**

Source: Personal Data

In table 5, the data distribution based on a history of falls above shows that the sample in this research consisted of elderly people who

had no history of falling as many as 24 people with a percentage of 65%, elderly people who had fallen once with a percentage of 30%, and elderly people who had fallen twice with a percentage of 5%.

The reduction in musculoskeletal system in elderly population causes a decrease in flexibility, muscle and joint strength, a decrease in cartilage function, and bone density which results in minimum physical ability in doing their daily activities. The low physical activity causes the reducing the physical quality of the elderly and causing the chronic diseases.

DISCUSSION

Body balance in elderly age

Balance is the body's ability to maintain the gravity center on the fulcrum, either at rest or in activity. When the balance of elderly body is difficult to control due to decreased function and degenerative, it will cause several problems and disease. Decreased activity usually arises due to fear of falling, injuries to fractures, head injuries and other accidents due to a tendency to fall. In line with research by Utami (2022) who said that the physical changes of the elderly were the result of a decrease in musculoskeletal system. Decreased bone density that become more brittle can affect to the bone strength and stability, kyphosis, impaired gait, shriveled tendons and scoliosis. The muscle fiber atrophy makes movement sluggish (bradykinesia), muscle cramps, tremors, decreased blood flow to muscles due to aging process. The changes in neurological system in brain affect the body balance on motor nerve components, called the motor reflex system. The elderly experience impaired sensation and proprioception as well as managing information that regulates body movement and position Neuromuscular degenerative changes. It resulting in sluggishness of movement (bradykinesia), short footsteps, decreased muscle strength, especially the lower extremities.

The feet cannot tread well and tend to be easily wobbly, besides that the elderly become slow in anticipating then they suddenly slip and stumble, causing the elderly to have balance disorders and ultimately the risk of falling increases. Muscle strength is one component of muscle performance that is generally needed in doing daily activities. Muscle strength is the ability of various muscle groups to produce tension and power during maximum effort, both dynamically and statically. Muscle strength is produced by maximum muscle contraction. When the muscle performance is good, the balance and daily activities can run well. The strong muscles are influenced by several things such as age, motivation, cognition, environment, fatigue, habits, and sufficient of physical activity. The research result showed that the fall history in elderly are closely related to their body balance during their daily activities.

CONCLUSION

It can be concluded that there is a relationship between physical activity and the risk of falling in elderly at Serengan. The lower or less physical activity the elderly does, the higher the risk of falling they have.

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