

The Level of Flexibility, Muscle Strength and Balance in the Elderly at Banjar Bhineka Nusa Kangin, Badung, Bali

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ABSTRACT

The elderly will experience changes in the structure and function of the systems in their body. These changes can be in the form of physical and biological changes such as blood pressure, pulse, muscle strength, muscle flexibility, and others. This research was conducted to determine the level of flexibility, muscle strength and balance in the elderly. The method used in this study is a quantitative method. The sample used was elderly > 60 years as many as 10 people (60-64=6, 65-69=4) who were taken using the total sampling method. The instruments used are 5 components of the Senior Fitness Test. The results showed that there was a significant decrease in the dynamic balance component.

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INTRODUCTION

An elderly person is someone who has entered the age of 60 years and over. The elderly are an age group of humans who have entered the final stages of their life. Age 60 years and over is the final stage of the aging process which has an impact on three aspects, namely biological, economic and social. Biologically, the elderly will experience a continuous aging process which is characterized by a decrease in physical endurance and vulnerability to disease attacks (Pramadita et al., 2019). Aging or becoming old is a biological process that cannot be avoided. The aging process occurs naturally. This can cause physical, mental, social, economic and psychological problems. Older age or old age is a closing period in a person's life span, namely a period where a person has moved away from previous periods that were more enjoyable, or moved away from times that were full of benefits (Akbar et al., 2021).

Balance is a term used to describe the dynamic process where the body is in a state of equilibrium. Balance in a controlled body position when at rest (static balance), controlled body position when in motion (dynamic balance), controlled body position when upright (standing, ambulation) and controlled body position when sitting (Primasari, 2018). Flexibility is a person's ability to carry out movements with a wide amplitude. With body flexibility or wide body extension, it means that a person can move freely, so that less energy is expended to carry out daily activities (Rahman et al., 2022). Muscle strength is the power released by a muscle or group of muscles to contract when holding a maximum load (Pasha Erik Juantara, 2019).

Elderly people who are no longer productive are usually caused by changes in body function, muscles, bones, joints and breathing. The elderly's muscles become stiffer and experience a decrease in muscle strength, this causes movement to become limited so that muscle flexibility also begins to decrease. For this reason, researchers measured any changes that occurred in elderly people > 60 years old using 5 components of the senior fitness test.

METHOD

The research method used in this research is a quantitative method by collecting data. This study aims to measure the level of flexibility, muscle strength and balance in the elderly using the senior fitness test. The sample used was the entire existing sample, namely 10 elderly people aged 60 years and over (60-64=6, 65-69=4). The instruments used in this research are the 5 components of the senior fitness test consisting of Back Stretch, Chair Sit-and-Reach, Arm Curl, Chair Stand, 8-ft Up and Go (Knapik et al., 2019). On the appointed day, researchers visited each elderly home to take measurements and collect data. Before taking measurements using the senior fitness test, the sample will have its vital signs (blood pressure, pulse, respiration and temperature) measured and stretched first. After carrying out the vital sign sample examination, they are directed to carry out a senior fitness test. The illustration depicting the process of data collection can be found in Figure 1.

Back Stretch is a test aimed at measuring flexibility in the shoulder joint. The equipment needed is a midline or ruler. The procedure for this test is carried out in a standing position, place one hand behind the head and try to reach as far as possible in the middle of the back, palm touching the body and fingers pointing downwards. Place the other arm behind your back, palm facing out and fingers up and reach as far as possible trying to touch or overlap the middle fingers of both hands. If it seems difficult, help with someone to guide and direct the sample into the correct movement so that the fingers are aligned, and to measure the distance, count at the tip of the middle finger. If the fingertips touch the other hand then the value is zero. If they do not touch, measure the distance between the fingertips (negative score), if they overlap, measure the difference in distance (positive score). Stop the test if you experience pain during the movement and don't force it for safety (Hambali et al., 2019)

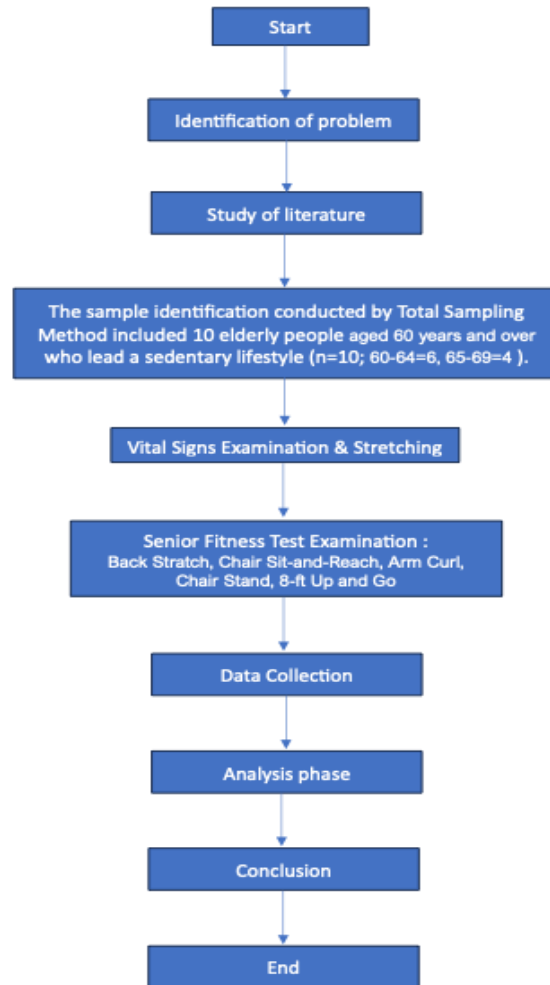


FIGURE 1. Flowchart on Data Collection Process

Chair Sit and Reach aims to measure the level of flexibility around the pelvis in the elderly. The equipment needed is a midline and a chair (approximately 44 cm high). Then asked to sit on the edge of the chair. Legs extended forward with knees straight, heels on the floor. Place one hand on top of the other with the tips of your middle fingers flat, move your fingers forward with your toes, bent at the hips. Keep your back straight and move forward slowly, avoid fast, forced movements or cause pain. Keep your knees straight, if your knees bend, slowly straighten your legs again and start again. The distance is measured between the fingertips and the toes. If the tip of the finger touches the toe then the value is zero. If they don't touch, measure the distance between the finger and toe (negative score), if they overlap, measure by how much (positive score) (Ignasiak et al., 2020a).

Arm Curl is a test to measure arm muscle strength. The equipment needed is dumbbells weighing around 2 kilograms (women), weighing 3 kilograms (for men). A chair without armrests, a stopwatch. The procedure is to do as many repetitions as possible in 30 seconds. The score taken is the number of arm bends successfully performed in 30 seconds (Latorre-Rojas et al., 2019)

Chair Stand is a test that measures leg muscle strength. The equipment is a chair with a straight back without armrests and a stopwatch. The instructions are when sitting in the middle of the chair, keep your feet steady on the floor, keep your back straight and keep your hands on your chest. At the signal "Go," rise to a full upright standing position and then sit back down again, performing the test for 30 seconds.

The 8-ft Up and Go is a test that measures speed, agility and balance. The equipment needed is a stopwatch, a back chair, duct tape, a clean area and enough space to carry out the test. The procedure is to place a chair and a marker such as duct tape 8 feet in front of the chair. Clean it so there is a safe path between the chair and the marker. The test is carried out by starting in a full sitting position, hands resting on knees and feet flat on the ground. At the command, "Go," the clock starts and the subject stands and walks (not runs) as quickly as possible (and safely), returning to the chair to sit. Calculation when time stops while they are sitting (Fitri et al., 2020)

RESULTS AND DISCUSSION

This research was conducted to determine the level of flexibility, muscle strength and balance in the elderly. After the data was collected, the following results were obtained.

TABLE 1. Back Strach results

	Good	Poor
Sample Group	N	
60-64 years old	6	-
65-69 years old	1	3
Percentage	70%	30%

Table 1 shows that during the Back Strach examination, which aims to assess the flexibility of the upper extremities, 30% of the subjects (i.e. 3 out of 10 people) had insufficient flexibility. The latest study by Silva et al. (2019) found a negative and low correlation between physical activity and upper limb flexibility in inactive elderly individuals aged 60 years and older. The differences in joint flexibility among older individuals may be related to differences in their physical activity patterns (Lohne-Seiler et al., 2016). According to our study, most elderly individuals showed good performance on the back scratch test. As a result, we speculate that performing low-intensity physical activities on a daily basis, like cooking, sweeping, and washing, can have a positive impact on the flexibility of the upper extremity joints.

TABLE 2. Chair Sit and Reach Results

	Good	Poor
Sample Group	N	
60-64 years old	6	-
65-69 years old	2	2
Percentage	80%	20%

Table 2 presents the results of a Chair Sit-and-Reach test that measures the flexibility of the lower extremities. The test revealed that only 2 out of 10 subjects, or 20% of the participants, had insufficient flexibility. Research conducted by Prabowo & Ranti, (2022) found that the elderly at the Panti Sosial Tresna Werdha (PSTW) Budi Mulia 3 Jakarta found that the flexibility of elderly men was mostly in the excellent and average categories with a percentage of 16.7%, then in the good and above average categories has a percentage of 8.3%, then in the below average category with a percentage of 4.2%. Furthermore, for women, the highest level of flexibility falls into the above average category, namely with a percentage of 16.7%, then in the very poor category it has a percentage of 12.5%, in the poor category it has a percentage of 8.3%, then in the good and average categories it has a percentage of 4.2%. According to our study, the majority of elderly individuals demonstrated good flexibility performance in their lower extremities.

Individuals aged 60 years and those aged 70 years showed no significant difference in lower body flexibility (Ignasiak et al., 2020). The other study concluded that lower body flexibility was one of the key fitness parameters that influenced maximal walking speed (Wu & Zhao, 2021).

TABLE 3. Arm Curl Results

	Good	Poor
Sample Group	N	
60-64 years old	6	-
65-69 years old	4	-
Percentage	100%	0%

Table 3 indicates that a test was conducted to evaluate the upper extremity muscle strength of 10 individuals through an Arm Curl examination. The result of the test showed that all 10 subjects had good muscle strength, which accounts for 100% of the subjects. Research conducted by Darwis et al., (2022) stated that 15 respondents (65.22%) had elderly people at the Panti Natar Wredha, South Lampung Regency with good muscle strength (65.22%), while 7 respondents (41.17%) had weak muscle strength.

TABLE 4. Chair Stand Results

	Good	Poor
Sample Group	N	
60-64 years old	6	-
65-69 years old	4	-
Percentage	100%	0%

Table 4 shows that the results of a Chair Stand examination which aims to measure a person's lower extremity muscle strength, it was found that 10 out of 10 people or 100% of the subjects examined had good muscle strength. Research conducted by Dewi, (2023) obtained an overview of the muscle strength of the lower extremities in the elderly in Banjar Mungseingan Desa Catur, Kintamani III Public Health Center, Bangli Regency. In 2023, the majority with a muscle strength score of 5 was 18 people (46.2%), while a score of 3 was 11 people (28.2%), value 4 was 10 people (25.6%). Meanwhile, on the left side, 15 people (38.5%) got a muscle strength score of 5, while 14 people (35.9%) scored 3, 10 people (25.6%) scored 4.

In our recent study, we found that the elderly population has good muscle strength in both their upper and lower extremities. This was observed through their impressive performance in the arm curl and chair stand tests. Our findings suggest that physical work, such as farming, involving activities like walking to the rice field and doing manual material handling, can have a positive impact on muscle mass and lower extremity muscle strength. A study conducted by (Kristiana et al., 2020) in an elderly community in Surabaya found a positive but weak correlation between upper extremity muscle strength and physical performance.

TABLE 5. 8-ft Up and Go Results

	Good	Poor
Sample Group	N	
60-64 years old	1	5
65-69 years old	-	4
Percentage	10%	90%

Table 5 shows that during the 8-ft Up and Go examination, which aims to measure a person's dynamic balance, it was found that 9 out of 10 people or 90% of the subjects examined had poor dynamic balance. According to the study by Silva et al., (2019), there was a negative and weak correlation between the time spent on moderate to vigorous activities and agility/dynamic balance measured using the 8ft up and go test. Dynamic balance that measure with the 8-ft up and go test was one of the main predictors of falls in elderly community (Duan et al., 2022). Dynamic balance and agility was one of the key fitness parameters influencing maximal gait speed, with aerobic endurance and lower body flexibility (Wu & Zhao, 2021).

Judging from the results of the examination that has been carried out, it shows that almost all the elderly who took part in the examination have poor dynamic balance. It can be seen from the 8-ft Up and Go examination which aims to check a person's dynamic balance, where it was found that 90% of the elderly who took the examination had poor results. This can cause the risk of falls in the elderly to be higher and can hinder daily activities.

CONCLUSION

Based on the results of examinations that have been carried out, it is known that the impact of decreased body function in the elderly is a decrease in balance in the elderly, especially dynamic balance, this results in the elderly experiencing a high risk of falls.

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APPENDIX

This appendix contains images that documenting the team while measuring the elderly.



FIGURE 2. Examination to assess the flexibility of the upper and lower extremities (a) The back starch examination (b) The Chair sit and react examination



FIGURE 3. Examination to measure arm and leg muscle strength (a) The arm curl examination (b) The chair stand examination