

EFFECTIVENESS OF TANDEM EXERCISE ON RISK OF FALL AMONG OLDER PEOPLE

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ABSTRACT

The older people population in Indonesia is predicted to continue to increase over the year. Increasing the number of older people will be a challenge for all. Older people might have decreased in the physiological body, especially in balance control such as changes in posture, changes in muscle strength, and visual decline. Balance disorder will increase the risk of falls caused and may result in the elderly being more susceptible to various diseases. Balance exercise such as Tandem Exercise is one way to reduce risk of fall. This research aimed to find out the effect of Tandem exercises on the risk of falling on the older people in Yogyakarta. This research was a Quasy Experimental study With Non-Equivalent Control Group Research Design. Samples of this study were 36 older people through purposive sampling technique and divided into two groups. Group 1 was given 15 minutes Tandem exercise, every day in two weeks. Group 2 was a control group. The risk of fall was measured by The Time Up and Go Test. This study found that mean score of group 1 was decrease after intervention. This study also found that there was no significant different mean score of fall risk between two groups before intervention ($p>0,05$), meanwhile there was a significant different mean score after intervention ($p<0,05$). A significant different on risk of fall score before and after intervention also found in group 1 ($p<0,05$). In conclusion, health care provider should facilitate older people to participate in balance exercise such as Tandem exercise actively to decrease fall risk among older people.

Keywords : *Tandem Exercise; Fall Risk; Older People*

1. BACKGROUND

Older people (elderly) are the final stage of the life cycle that will be experienced by every individual. The older people experience a decrease in body condition, especially from a physical perspective (Padila, 2013). It is estimated that from 2010-2035 the older people population in Indonesia will enter the aging period, as many as 10% of the population will be aged 60 years and over. (Yan et al., 2019). Badan Pusat Statistik (BPS) in 2015 has reported the province with the highest proportion of older people

population, namely D.I. Yogyakarta with 13.4% (Nuraini et al., 2017).

Older people have a lot of decline in the physiology of the body, especially in controlling balance such as changes in posture, changes in muscle strength, visual decline, body system disorders and fat levels that accumulate in certain areas. (Rahmadani, 2016). These changes in the elderly can cause delays in moving so that they become easily unsteady and at risk of falling during activities. With increasing age, the older people will also increase the risk of falling caused by balance disorders and can make the

older people more susceptible to various diseases (Yulitasari et al., 2015).

Falls are one of the main causes of death and injury in the older people population. 20-30% of the older people who have a high degree of disability related to falls will experience a loss of freedom for ADL (Activity of daily living), decreased quality of life and also increased the risk of death (Kurniawan, 2014). A survey in Indonesia, based on Riset Kesehatan Dasar (RISKESDAS) found that in 2013 stated that the prevalence of injuries due to falls at the age of 65-74 years was around 67.1% and at the age of 75 years and over was around 78.2%. (Umah, 2018).

Falls that occur are reported by around 30% of people aged 65 years and over for each year and 40% -50% of people aged 80 years and over (Dwi Prabowo et al., 2020). One-third of people aged 65 years and over who live in the house (community) experience one falls each year and about 1 in 40 people who fall require hospital treatment. In nursing homes, about 50% of the elderly experience one falls each year, about half of those who experience repeated falls and about 10-25% experience serious complications. In Indonesia, according to RISKESDAS that has been conducted by Riyadina (2009) injuries due to falls in the elderly, the proportion is around 70.2%. (Setyawan, 2018). The incidence of falls in the elderly at BPSTW Budi Luhur Yogyakarta unit in 2015 was 38.5% consisting of 29 elderly out of 75 elderly (Sari, 2015).

To reduce the risk of falling in the older people, balance exercises can be used, namely physical exercise, regular exercise, square stepping exercise, swiss ball, elderly exercise and Tandem exercise. Tandem Exercise is a balance test and exercise that is carried out by walking in a straight line with the heel of the foot touching the other toe by walking 3-6 meters, this exercise can improve postural balance in the lateral part which plays

a role in reducing risk fall in the elderly. This exercise is a type of balance exercise involving proprioceptive body stability (Rahmadani, 2016). This Tandem exercise aims to train body position or posture, movement of the body and coordination and control

The technique for carrying out the tandem walking exercise is as follows: The first technique: both legs side by side is intended to train the balance of the legs which is done by pressing the legs together and standing straight for 10 seconds or as much as possible. For 10 seconds you can move your head left, right, up and down. Furthermore, the same technique is performed but with the eyes closed. Second technique: semi tandem walking exercise is a movement to train foot balance which can be done by placing the heel of the foot next to the big toe of the other foot and holding on for 10 seconds or as much as possible. For 10 seconds you can move your head left, right, up and down. The third technique: the full tandem walking exercise is a movement to train balance on the foot which is done by attaching the heel of the foot to the tip of the big toe of the other foot. For 10 seconds while moving your head left, right, up and down. After that asked to walk forward on the path (one straight line) by placing the right foot touching the left foot and walking 3-6 meters. Do it 10 times then rest (Umah, 2018).

Because of the importance of increasing balance movements for the elderly, researchers are interested in conducting research on tandem exercise. This study aims to determine the effect of Tandem Walking Exercise on the risk of falling in the elderly in Yogyakarta.

2. RESEARCH METHOD

This research was a Quasy experimental research with Pretest-Posttest With Control Group. The sample in this study was

selected using a purposive sampling technique of 36 elderly people who were divided into 2 groups. Group 1 was the intervention group that received the Tandem walking exercise intervention every day for 15 minutes and was carried out for 14 days. Group 2 is the control group. Each group measured the risk score of falling on the first day and the 14th day. The research was conducted in August 2022 in the Bantul Regency, Yogyakarta

Fall risk was measured using The Time Up and Go test. The research instrument was the Time Up and Go Test observation sheet with a measuring instrument in the form of a calibrated stopwatch. Respondents were measured the time to walk according to their ability to travel a distance of 3 meters to and walk back to the chair and sit back leaning back. Older people was at risk of falling with a score of more than 20 seconds. Paired Sample T-Test and Independent Sample T-Test were used in this study

3. RESULT

This study found:

Table 1. Characteristic of Respondents

Characteristic	Intervention group (n=18)		Control group (n=18)		Total	
	n	%	n	%	n	%
Gender						
Male	9	50,0	9	50,0	18	50,0
Female	9	50,0	9	50,0	18	50,0
Education						
No formal education	5	27,8	4	22,2	9	25,0
SD	9	50,0	9	50,0	18	50,0
SMP	2	11,1	5	27,8	7	19,4
SMA	2	11,1	-	-	2	5,6
Occupation						
Household	5	27,8	4	22,2	9	25,0
Farmer	8	44,4	10	55,6	18	50,0
Self-employed	3	16,7	2	11,1	5	13,9
Retirement	2	11,1	2	11,1	4	11,1
Age						
60-65 years old	11	61,1	11	61,1	22	61,1
65-70 yoars old	7	38,9	7	38,9	14	38,9
Exercise activity						
Regularly	8	44,4	9	50,0	17	47,2
Not regularly	10	55,6	9	50,0	19	52,8

Table 1 showed the characteristics of the respondents in this study, the majority aged 60-65 years (61.1%), primary school education level (50%), farmer (50%) and did not exercise regularly (52.8%). Gender male and female each as much as 50%.

Table 2. The Differences of risk fall before and after intervention in1 each group

Groups	Mean	Mean difference	P value
Control			
Pretest	18,27	0,06	0,816
Posttest	18,33		
Intervention			
Pretest	18,72	2,67	0,001
Posttest	16,05		

Based on table 2, it was found that there was no significant difference in the control group in measuring the risk of falling on the first day and the 14th day (p value > 0.05). In intervention group, it was found that the average risk of falling from 18.72 seconds to 16.05 seconds decreased and there was a significant difference before and after Tandem Exercise (p value <0.05).

Table 3. The Differences of risk fall in both groups

	Mean	Mean difference	P value
Pretest			
Intervention	18,72	0,45	0,647
Control	18,27		
Posttest			
Intervention	16,05	2,28	0,032
Control	18,33		

Table 3 shows that there was no significant difference in the risk of falling scores on the first day of measurement in the intervention group and the control group (p value > 0.05). On the 14th day of measurement after the tandem walking exercise in the intervention group, there was a significant difference between the two groups (p value <0.05).

4. DISCUSSION

From the results it can be seen that the mean value in the intervention group before being given the tandem walking exercise intervention was 18.72 seconds. The fall risk score after giving tandem walking training was 16.05 seconds. The mean difference (average) between the pretest and posttest is 2.72 seconds. This shows that there is an effect of tandem walking training on the risk of fall among older people.

The Tandem exercise was applied it by doing walking exercises in a straight line for 3 meters with the heel of the foot touching the other toe, this was done 1 day once a week. This research is in line with research conducted by Nugrahani (2014) which showed that tandem walking training was better than swiss ball training, as evidenced by the decrease in average walking speed or an increase in walking speed of 33.17%, while swiss ball training gained the result of an increase in walking speed was 15.64%.

This tandem exercise trains visually by looking ahead and broadening the direction of view so that it broadens the direction of view to be able to walk straight. Tandem walking exercise also activates the somatosensory and vestibular (proprioceptive) which maintains an upright body position while walking. Proprioceptive training involves slow motion in every movement and position change so that the subcortical nuclei and basal ganglia analyze position sensations and send feedback in the form of expected muscle contractions. Furthermore, this exercise was adapted as a new functional stability (PN, 2014).

With increasing age in a person will decrease the function and ability of the body both psychologically and physically which results in impaired function from the addition of age (Anggraini et al., 2015). Aging is a normal process. In older people, there is a physiological decrease in the body, especially those that affect balance control such as changes in posture, decreased muscle strength, fat levels that accumulate in certain areas, decreased proprioception and decreased visual system which results in poor balance which raises the risk of falling in older. (World & Organization, 2015).

The results of research conducted by Frederic, et al which was conducted on the elderly concluded that elderly people who do regular balance exercises will reduce the risk of falling. (Frederic & Al Haris, 2022). The results of other studies also revealed that there is a good postural balance as a result of routine balance exercises that will reduce the risk of falling in older people (Muladi, 2022).

Good balance affects walking speed, the better the balance, the better the walking speed (Santoso et al., 2015). Balance also affects the risk of falling in the elderly due to physiological changes in the form of increased vestibular excitability, worsening perception, degeneration of vision, reduced muscle mass and muscle strength, reduced range of motion in the joints, changes in the center of gravity in the elderly, slowed postural response, which is the main component of balance control to reduce the risk of falling (Talkowski et al., 2008).

5. CONCLUSION

This study can be concluded that there is an effect of tandem walking training on the risk of falling in the elderly. Health workers are expected to be able to provide education about tandem walking exercises for the elderly and their families to minimize the risk of falling.

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