

Tandem Walking Exercise For The Risk Of Falling and The Daily and Activities' Independency Toward Elderly Preopleat UPT PSTW Nirwana Puri Samarinda

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ABSTRACT

Background: Stability is the ability of maintaining static and dynamics equilibrium, which influenced the falling incident and the capability in doing everyday activities of elderlies

Purpose: The purpose of this study is to analyze the effect of tandem walking exercise for the daily activities' independency and the risk of falling towards elderly people.

Methods: This research is quasi experiment with pre and post-test nonequivalent control group design. The samples are 22 people that distributed into control and treatment group who were given tandem walking exercise three times a week for two weeks. Assessment of the independence of daily activities through observation, interviews and using barthel index instruments while falling risk is assessed using Time Up and Go Test (TUGT).

Results: The result of hypothesis tests with Wilcoxon obtained that there is an impact from tandem walking exercise for the daily activities' independency (p value = 0,009) and the risk of falling (p value = 0,003). The deviation analysis on two groups acquired that the Group 1 with interventions of tandem walking exercise is having more impact on the improvement of daily activities' independency with Mann-Whitney test (p value = 0,044) and the reduction on risk of falling with Independent T-Test (p value = 0,000) compared to Control Group.

Conclusion: Tandem walking exercise could improve daily activities' independency and lower the risk of falling towards elderly people.

Keywords: Tandem Walking, Independency, Elderly People, Risk Of Falling.

BACKGROUND

Along with the increase in the welfare and health of the population, Life Expectancy (UHH) has also increased. Life expectancy in Indonesia in 2015 reached 70.8 years, an increase from 70.07 years in 2013. This figure shows that life expectancy in Indonesia is getting higher from year to year. The increase in life expectancy is directly proportional to the increase in the elderly population. The elderly population in Indonesia reaches 20.24 million people, equivalent to 8.03% of the entire population of Indonesia (Badan Pusat Statistik, 2014), while data Kementerian Kesehatan RI (2016), the percentage of the elderly population in Indonesia reaches 8.5% of the total population of Indonesia. total population in Indonesia.

Problems that often occur due to an increase in the number of the elderly population such as physical, psychological, and social decline (Padila, 2013). Falls are one of the physical problems that often occur in the elderly. Falls can result in various types of injuries, physical and psychological damage. The most worrying consequences of falls are fractures that cause \pm 20-30% of deaths, head trauma, fear of repeated falls and the most common is loss of independence due to decreased movement and functional ability (Stanley, M., & Beare, 2007).

The results of a preliminary study in April 2017 found that the number of elderly people was 88 people, with a level of independent dependence as much as 54.25%, mild dependence as much as 38.29%, moderate dependence as much as 1.06%, severe dependence as much as 5.31%, and total dependence. as much as 1.06%. While the results of a preliminary study in October 2017, out of a total of 102 elderly people, 9 elderly people have fallen in the past year. This figure has increased compared to the previous year, which was 6 incidents of falls. This shows the high incidence of falls in the elderly.

Good, correct, measurable, and regular physical exercise (BBTT) as well as exercises that are in accordance with the level of health, physical activity, and fitness of each individual can reduce the risk of bone disorders that cause the risk of falls in the elderly (Tobing, 2011). One of the best physical exercises is balance training. Balance training is important in the elderly because this exercise really helps to maintain a stable body so as to prevent falls that often occur in the elderly, optimize their abilities so as to avoid the impacts that occur due to their inability (Nugrahani, 2014).

The tandem stance is a test as well as an exercise performed by walking in a straight line with the heel of the foot touching the toes of the other for 3-6 meters. This exercise can improve lateral postural balance which plays a role in reducing the risk of falling in the elderly and is a type of balance exercise that involves proprioception of body stability (Baston, 2009).

The formulation of the problem in this study is "Is there an effect of tandem walking exercise on the risk of falling and the independence of daily activities in the elderly at UPTD PSTW Nirwana Puri Samarinda?".

OBJECTIVE

The purpose of this study was to determine the effect of tandem walking exercise on the risk of falls and the independence of daily activities in the elderly at UPTD PSTW Nirwana Puri Samarinda.

METHODS

This research is quasi experiment with pre and post-test nonequivalent control group design. The population at the time of the study amounted to 102 elderly in UPTD Nirwana Puri Samarinda. A sample of 22 people was selected based on consecutive sampling

technique and divided into 2 groups, 11 people in the control group took part in elderly gymnastics which was routinely held at the orphanage and 11 people in the treatment group were given tandem walking exercises as far as 3 meters in 3 sets with a frequency of 3 times. intervention every week for 2 weeks. Data collection was carried out on April 23 – 05 May 2018 at UPTD PSTW Nirwana Puri Samarinda.

The data collection stage is through direct measurement of the independence of daily activities and the risk of falling pre-test and post-test of tandem walking exercises. Assessment of the independence of daily activities through observation and interviews using the Barthel index instrument while the risk of falling is assessed using the Time Up and Go Test (TUGT).

The data that has been collected was analyzed by comparing the value of independence in daily activities and the risk of falling before and after giving tandem walking exercises using the Paired T-Test statistical test and the Wilcoxon test on data that did not meet the assumptions (not normally distributed). Furthermore, the analysis was carried out using the Independent T-Test test on normally distributed data or the Mann Whitney test on data that were not normally distributed to test the difference in the mean of the two measurement results in the two groups.

RESULTS

Respondents who became the sample amounted to 22 people. There were no respondents who dropped out in this study. Tables 1 show the frequency distribution of the respondents' characteristics.

Table 1. Frequency Distribution of Respondents by Gender and Age

Variable	Group 1	Group 2
Gender:		
Male	4 (36,4%)	4 (36,4%)
Female	7 (63,6%)	7 (63,6%)
Age (years):		
60 – 64	1 (9,1%)	0
65 – 69	3 (27,3%)	2 (18,2%)
70 - 74	7 (63,6%)	9 (81,8%)

Based on table 1, the average respondent in this study was > 70 - 74 years old. This is in accordance with the Departemen Kesehatan RI, (2009) which says that over 70 years of age is a high risk age group. Ages over 70 years experience decreased body system functions, including balance, compared to elderly people aged less than 70 years. The decline in the function of these body systems includes the neurological, sensory, cardiovascular, and musculoskeletal systems.

The sample in this study amounted to 22 people who were divided into two groups with a frequency of four males and seven females in each group. This shows that there are more women than men. This is supported by research by Maryam, R. S., Sahar, J., & Nasution, (2009) which states that balance disorders are more common in elderly women than men. Hormonally, elderly women experience menopause where there is a decrease in the hormone estrogen which can cause bones to lose calcium so that it affects balance (Mauk, 2010).

Table 2. The Risk Of Falling and The Independence of Daily Activities in Group 1

Responden	The Risk Of Falling			The Independence of Daily Activities		
	Pre	Post	Difference	Pre	Post	Difference
1	13,8	9,21	4,62	19	20	1
2	28,1	17,6	10,48	19	19	0
3	18,0	14,7	3,23	19	20	1
4	16,4	10,2	6,21	19	20	1
5	15,0	10,4	4,55	19	20	1
6	32,4	27,3	5,04	16	18	2
7	16,3	10,7	5,62	18	20	2
8	19,7	12,7	7,00	20	20	0
9	14,1	10,6	3,45	20	20	0
10	23,6	18,1	5,58	17	19	2
11	19,5	14,7	4,78	19	20	1
Mean	19,7	14,2	5,51	18,6	19,6	1,00
SD	6,01	5,31	1,98	1,21	0,67	0,78

Table 2 shows the difference in the mean and standard deviation between the pre-test and post-test for independence of daily activities, namely 1.00 ± 0.78 , while the difference between the mean and standard deviation of the risk of falling is 5.51 ± 1.98 . It can be concluded that there was a change in the independence of daily activities and the risk of falling between pre-test and post-test in group 1.

Table 2. The Risk Of Falling and The Independence of Daily Activities in Group 2

Responden	The Risk Of Falling			The Independence of Daily Activities		
	Pre	Post	Difference	Pre	Post	Difference
1	20,3	19,8	0,54	19	20	1
2	18,8	15,6	3,22	19	19	0
3	21,7	17,6	4,15	18	19	1
4	18,5	16,9	1,64	19	19	0
5	23,6	22,4	1,17	18	18	0
6	23,7	23,3	0,46	18	18	0
7	15,4	13,7	1,69	19	19	0
8	15,2	13,1	2,08	19	20	1
9	21,3	20,4	0,87	18	18	0
10	16,2	15,8	0,41	19	19	0
11	16,9	14,1	2,83	18	19	1
Mean	19,2	17,5	1,73	18,5	18,9	0,36
SD	3,11	3,51	1,23	0,52	0,70	0,51

Table 3 shows the difference in the mean and standard deviation between the pre-test and post-test for independence in daily activities, which is 0.36 ± 0.51 , while the difference between the mean and standard deviation of the risk of falling is 1.73 ± 1.23 . Based on these data, it can be concluded that there is a change in the independence of daily activities and the risk of falling between pre-test and post-test in group 2.

Table 4. Hypothesis Significance Test Two Paired Samples

Variable	Value	Pre Test	Post Test	P
Group 1				
Risk of fall	Median (Min-Maxs)	18,01 (13,83-32,43)	12,78 (9,21-27,39)	0,003
The Independence of Daily Activities	Median (Min-Maxs)	19 (16-20)	20 (18-20)	0,009
Group 2				
Risk of fall	Mean± SD	19,29± 3,11	17,56± 3,51	0,001
The Independence of Daily Activities	Median (Min-Maxs)	19 (18-19)	19 (18-20)	0,046

In table 4 the results of hypothesis testing from the pre-test and post-test values using the Paired T-Test and the Wilcoxon test show that in both groups there is a change in the independence of daily activities and the risk of falling, both in group 1 with tandem walking exercise intervention. as well as in group 2 who took part in routine elderly gymnastics held at the orphanage.

Table 5. Differences in The Mean Difference Between Risk of Fall and Daily Activity Independence and risk of falls in group 1 and group 2

Variable	Group	Value	Difference	P
Risk of fall	1	Mean± SD	5,51±1,98	0,000
	2	Mean±SD	1,73±1,23	
The Independence of Daily Activities	1	Median (Min-Maxs)	1 (0-2)	0,044
	2	Median (Min –Maxs)	0 (0-1)	

Table 5. The test of the difference in the average difference in the independence of daily activities in groups 1 and 2 was carried out with the Mann-Whitney test showing the value of the median difference (minimum-maximum) of 1 (0-2) in group 1 and in group 2 of 0 (0-2). 1), with p value = 0.044 < 0.05. While the test for the difference in the mean difference in risk of falling in groups 1 and 2 was carried out with the Independent T-Test test, the difference between the mean and standard deviation values was 5.51 ± 1.98 in group 1 and in group 2 of 1.73 ± 1.23, with p value = 0.000 < 0.05. Based on the results of these data, it was concluded that statistically there was a significant difference between the average difference in the independence of daily activities and the risk of falling in the two groups. So that group 1 with tandem walking exercise intervention had a greater effect on increasing independence in daily activities and decreasing the risk of falling compared to group 2 or the control group.

DISCUSSION

The tandem walking exercise is a test as well as an exercise performed by walking in a straight line with the heel of the foot touching the toes of the other for 3-6 meters (Baston, 2009). In a previous study conducted by Nugrahani (2014) it was revealed that giving tandem walking exercises was able to improve balance, besides tandem walking is one of the exercises that aims to train posture or body position, control balance, muscle coordination and body movements. Research that focuses on balance with tandem walking

exercises has also been conducted by Talkowski, et al. (2008) with the title Impact of Health Perception, Balance Perception, Fall History, Balance Performance, and Gait Speed on Walking Activity in Older Adults. This study was conducted on elderly people over 65 years old and concluded that elderly people who have good proprioception and a history of falling slightly have a good balance in walking speed. Balance also affects the risk of falling in the elderly because of physiological changes in the form of increasing the threshold of vestibular stimulation, worsening perception, visual degeneration, reduced muscle mass and muscle strength, reduced joint range of motion, changes in the center of gravity in the elderly, slowed postural responses, is the main component of controlling balance (Irfan, 2010).

The researcher assumes that the change in the independence of daily activities and the risk of falling in group 1 and group 2 is caused by the respondent's condition in a good condition at the time of the study so that the respondent can participate in the intervention provided, namely tandem walking exercises and regular elderly gymnastics at the orphanage. In addition, respondents also prevent extrinsic factors from falling during activities, for example walking by holding on to a handrail or using a walking aid, arranging furniture so as not to block the road, or asking other people to assist when walking.

Table 5 was concluded that statistically there was a significant difference between the average difference in the independence of daily activities and the risk of falling in the two groups. This is because elderly exercise alone is not enough to improve balance in the elderly, other combinations of exercises are also needed to further optimize the balance of the elderly, for example tandem walking, thai gymnastics, swiss ball, and others. These results are in line with the research conducted by Munawwarah, M., & Nindya, (2015) which found that tandem walking had a significant effect on improving the balance of the elderly. Tandem walking also affects the M/L (medial/lateral) walking relationship, controlling the ankle, investor/ everstor mechanism, dominant muscles load/unload from hip abduction and adduction, whereas in AP conditions, tandem walking will increase hip extensor and flexors so that they can train sensory and motor skills to maintain balance in a neuro-control perspective (Winter, 2009).

Researchers assume that elderly balance exercises that only contain elderly exercise have several shortcomings, namely the use of the body's sensory response to the balance of the elderly is not optimal, so it takes a combination of other exercises that can support the balance of the elderly not only from motor responses but also sensory and neurological responses. The addition of tandem walking exercises can improve balance better than just doing elderly exercise alone.

CONCLUSION

Based on the results of the study, it can be concluded that the tandem walking can decrease the risk of fall and increase the daily activities independence towards elderly people. It is recommended that health workers, both nurses, and doctors, use *tandem walking* in elderly people. Further research is needed to to compare tandem walking exercise with other balance exercises in terms of improving daily activities' independency and reducing the risk of falling towards elderly people.

ACKNOWLEDGMENTS

We thank the Health Polytechnic of the Ministry of Health of East Kalimantan, UPTD PSTW Nirwana Puri Samarinda, all respondents who participated in this study.

REFERENCES

- Badan Pusat Statistik. (2014). *Statistik Penduduk Lanjut Usia*.
<https://doi.org/https://doi.org/10.1017/CBO9781107415324.004>
- Baston, G. (2009). Proprioception. *International Association for Dance Medicine and Science*, 1829–1841.
<http://onlinelibrary.wiley.com/doi/10.1002/cbdv.200490137/abstract>
- Departemen Kesehatan RI. (2009). *Profil Kesehatan Indonesia 2008*.
- Irfan, M. (2010). *Fisioterapi Bagi Insan Stroke*. : Graha Ilmu.
- Kementerian Kesehatan RI. (2016). *Situasi Lanjut Usia (Lansia) di Indonesia*. Pusat Data Dan Informasi Kementerian Kesehatan RI.
- Maryam, R. S., Sahar, J., & Nasutio, Y. (2009). Pengaruh Latihan Keseimbangan Fisik Terhadap Keseimbangan Tubuh Lansia di Panti Sosial Tresna Werdha Wilayah Pemda Depok. In *Fakultas Keperawatan UI*.
- Mauk, K. L. (2010). *Gerontological Nursing: Competencies for Care* (2nd ed). Janes and Barlett Publishers.
- Munawwarah, M., & Nindya, P. (2015). Pemberian Latihan Pada Lansia Dapat Meningkatkan Keseimbangan Dan Mengurangi Resiko Jatuh Lansia. *Jurnal Fisioterapi*.
- Nugrahani, P. (2014). Latihan Jalan Tandem Lebih Baik Daripada Latihan dengan Menggunakan Swiss Ball Terhadap Peningkatan Keseimbangan untuk Mengurangi Resiko Jatuh Pada Lanjut Usia (Lansia). *Jurnal Fisioterapi*, 14(2), 87–96.
- Padila. (2013). *Buku Ajar Keperawatan Gerontik* (1st ed). Nuha Medika.
- Stanley, M., & Beare, P. G. (2007). *Buku Ajar Keperawatan Gerontik* (2nd ed). EGC.
- Talkowski, J. B., S. Brance, J., Studenski, S., & B. Newman, A. (2008). Impact of Health Perception, Balance Perception, Fall History, Balance Performance, and Gait Speed on Walking Activity in Older Adultst. *Physiotherapy Journal*, 88(12), 1474–1481.
<https://doi.org/10.2522/ptj.20080036>
- Tobing, H. G. (2011). *Prinsip Ilmu Bedah Saraf*. Sagung Seto.
- Winter, D. A. (2009). *Biomechanical Motor Control Human Movements* (pp. 359–467).