

## The Effectiveness of Tandem Walks on Reducing the Risk of Falling in the Elderly: A Case Report

### *Efektivitas Jalan Tandem dalam Mengurangi Risiko Jatuh pada Lansia: Laporan Kasus*

Amelia Hayati<sup>1\*</sup>, Iqbal Pramukti<sup>2</sup>, Setiawan Setiawan<sup>2</sup>

<sup>1,2,3</sup> Universitas Padjadjaran, Bandung, Indonesia

\*e-mail: [amelia17008@mail.unpad.ac.id](mailto:amelia17008@mail.unpad.ac.id)

#### Abstract

**Objective:** This case report aims to determine the effectiveness of tandem walking interventions in the elderly with a diagnosis of fall risk in the community.

**Methods:** This case uses a case report involving one elderly person in a community with a high risk of falling category. The tandem walking intervention was carried out for ten days at least once a day, and a Tinetti Gait and Balance test was carried out to see the fall risk category before and after the tandem walking intervention was given.

**Results:** After being given the tandem walking nursing intervention for ten days, although there was no change in the fall risk category, there was a decrease in the Tinetti Gait and Balance score compared to before the intervention. In addition, the elderly said that after doing tandem walking, their walk was more balanced, and they did not need assistance when walking by holding the wall around it like before.

**Conclusion:** The results of this case report only involved one elderly, but the interventions provided can reduce this bias because they can reduce the risk score of falling. Thus, case report can be used as an initial study for further research related to modification of tandem roads in the context of the elderly population in a larger sample with a true experiment design.

**Keywords:** Elderly, tandem walking exercise, risk of falling.

Article History	Submitted	Revised	Accepted
	2023-03-29	2023-04-07	2023-03-09

## Introduction

The risk of falling in the elderly increases with increasing risk factors categorized as intrinsic and extrinsic. Intrinsic causes include a history of falls, increasing age, gender, consumption of drugs, cognitive impairment, poor nutrition, and sensory disturbances<sup>1</sup>. Meanwhile, extrinsic factors are related to environments with poor lighting, uneven surfaces, and slippery floors<sup>1</sup>. Falling is one of the most common and serious problems that result in injury<sup>2</sup>. Falls are more common in the elderly over 65 years, especially in community areas, as much as 30% to 40% per year<sup>3</sup>. As many as 1 in 3 elderly people fall, resulting in hip fractures and head trauma. The risk of falling among the elderly also results in fatal risks, such as death.

Falls are a major cause of serious injury and death in the elderly. The severity of the injury varies from 40-60% resulting in major lacerations, fractures, and traumatic brain injuries<sup>4</sup>. In addition, as many as 68% experienced functional declines, 15% disrupted social and physical activities, and nearly 95% experienced femoral fractures to osteoporosis due to high damage related to age changes and comorbidities<sup>5</sup>. In addition, falling among the elderly increases the risk and incidence of death.

Balance in the elderly is a common problem that causes falls in the elderly<sup>6</sup>. Elderly with physiological decline will reduce balance control due to changes in body posture, decreased proprioception, and decreased visual<sup>7</sup>. Balance is the basis of the ability to stand upright and move together. Therefore, balance is important in preventing falls<sup>8</sup>. So the elderly need stable movements that effectively and efficiently reduce the risk of falling. To overcome the loss of control in balance, it is necessary to have exercises that can improve balance control.

Several modalities are used as interventions in improving outcome balance. Tandem road training, training swiss ball, and training balance strategy is an intervention that has been widely applied and researched<sup>7,8</sup>. Based on Munawwarah & Nindya research, tandem walking training is better than using a swiss ball<sup>7</sup>. In addition, tandem walking is more effective at improving balance than the exercise balance strategy<sup>8</sup>. So tandem walking is more effective in improving balance because it can train visually by broadening the direction of view so that it can walk straight and is able to activate proprioceptive (vestibular) and somatosensory, as well as improve gait patterns.

There are three techniques in doing a tandem walk: both legs side by side (side to side), semi-tandem, and full tandem<sup>8</sup>. In the implementation of tandem walks, there are several categories: the elderly with assistance and the elderly with supervision. There was research conducted at the Tresna Werdha J. Soenarti Nasution Institution, as many as 50% of the elderly were assisted and the rest were supervised in carrying out tandem walking exercises. So in providing interventions given to one elderly person in the community, supervision is carried out on the elderly to prevent falls that are adjusted to the ability of the elderly.

## Methods

The method used is a case report by explaining the nursing interventions performed on the elderly with fall risk problems, carried out on September 24 - November 13, 2022. Participants were women aged 74 years with a history of hypertension 4 years ago.

The observation results show that the posture is slightly bent when examining the strength of the right extremity muscles 5/5 and 5/4 left. On examination of the KATZ Index (self-category) and Barthel index (partial dependency), due to being unable to do it alone when it comes to climbing stairs, exercising, and using free time. Balance check using Tinetti Gait and Balance Assessment Tool (high fall risk). From the assessment results, the authors focus on case reports with priority nursing problems and risk of falling.

The nursing intervention given to the elderly is fall risk management. Fall management is carried out by providing tandem walking interventions. The elderly were recommended to walk in tandem for 10 days with a frequency of at least once a day for 3-6 meters. The elderly were encouraged to practice at home, where a 3-meter-long line is made from the front door to the house's living room. Before carrying out the intervention, the elderly were assessed Tinetti Gait and Balance test with the interpretation of results 0-5 (low fall risk), 6-10 (moderate fall risk), and 11-15 (high fall risk). This assessment is carried out to see the fall risk category before intervention.

The elderly were monitored for 10 days and follow-up daily adherence through home visits and applications WhatsApp to family. After 10 days of intervention, the

elderly were reassessed Tinetti Gait and Balance test to evaluate the intervention's success.

## Results

After being given a tandem walking intervention for 10 days with a frequency of 1-3 times a day along 3-6 meters, there are results pre-test and post-test and a decrease in score Tinetti Gait your Balance.

**Table 1.** Percentage of Falling Risk Reduction

Analysis Results	Score
Pre-test	13
Post-test	11
Difference	2

Table 1 shows an interpretation of the results with a high fall risk category but a decrease in the score, as evidenced by the score-test 13 and score post-test 11 after being given a fall risk management intervention. Then, it is objectively proven that the elderly routinely do tandem walks every day as suggested. The elderly can consistently walk in a balanced manner and do not need assistance when walking by holding the wall around them differently than before being given the intervention.

## Discussion

This case report shows that the elderly who are over 65 years old with a risk of falling problems caused by balance disorders. Old age is a process of growth and development. The elderly experienced decreased musculoskeletal, neurological, and sensory systems<sup>9</sup>. Elderly with physiological decline will reduce balance control due to changes in body posture, decreased proprioception, and decreased visual<sup>7</sup>.

The fall risk management intervention in the form of tandem walking to improve the balance control provided showed significant results in a decrease in score Tinetti Gait and Balance Which followed up during the 10 days of the intervention. Then subjectively, the elderly said that after doing tandem walks regularly, walking in a line, they become balanced and symmetrical and no longer need help holding on to the walls of their house. Results case report aligns with research conducted by Scura & Munakomi, which showed that before and after being given tandem walking training, it was measured using Tinetti Gait and Balance Test to determine the fall risk category<sup>10</sup>.

In the implementation of the provision of tandem roads, this has different from the provision of previous tandem roads. The provision of tandem walking interventions for the elderly is carried out in the house by making a 3-meter-long line that is placed close to the wall; this makes it easy for the elderly when they lose control of their balance. The elderly can withstand falling by relying on a wall near their body.

The tandem walking intervention mechanism for increasing balance control involves activating balance control and proprioceptive responses<sup>6,11</sup>. Tandem walking movements are carried out slowly in every position and movement which can affect an increase in the proprioceptive response so that basal ganglia can analyze position sensations and provide feedback in the form of expected muscle contractions<sup>6</sup>. In addition, tandem roads also improve input sensory (visual, vestibular, and somatosensory) which will be processed in the brain as central processing which affects the determination of the body's fulcrum and aligning the body's gravity by forming good posture so that the sensory response needed by the body will be forwarded through impulses to the effect with the result that the body can create good stability when moving<sup>11</sup>.

Results case report obtained a decrease in pre-test and post-test of 13.3% for 10 days. Meanwhile, in Wahyuni Novianti et al study, there was a reduced risk of falling with a pre-test and post-test difference of 66.9% for 5 weeks<sup>8</sup>. In line with Isawati's research, the duration of tandem walking affects the achievement of results in increasing balance control with tandem walking treatment at least 3 times a week for 5 weeks will result in effective proprioceptive activation. Muscles and joints<sup>12</sup>.

Implications of case report This study focuses on preventive, promotive, and curative roles. Assessment of the risk of falling and providing preventive measures for the elderly that have been implemented in the community and the clinic increase the positive impact on the elderly or patients by reducing the incidence of elderly falls, which are a cause of morbidity and mortality<sup>13</sup>. In addition, providing prevention in the form of fall risk education conducted in the community can increase awareness of fall risk among the elderly, both changes in behavior and knowledge to improve quality of life<sup>14</sup>.

Case reports it has various limitations. First, it only involved one elderly, so the variety of cases and the factors that led to the success of the intervention could not be observed in depth. Besides that, case reports rate the intervention with a follow-up 10-day intervention. Previous studies suggest that the intervention is carried out for 2-5 weeks, which may be a factor in the large decrease in the fall risk score.

## **Conclusion**

This case report shows has a risk of bias because it involves one elderly, but the intervention given can reduce this bias because it can reduce the risk score of falling. Case report This can be used as an initial study for further research related to tandem walking

modifications in the context of the same population, namely the elderly, but in a larger sample with a design true experiment.

## References

1. Kamel MH, Abdulmajeed AA, Ismail SES. Risk factors of falls among elderly living in Urban Suez - Egypt. *Panafrican Med J.* 2013;14(26). doi:10.11604/PAMJ.2013.14.26.1609
2. Vasy A. Diffraction at Corners for the Wave Equation on Differential Forms. *Commun Partial Differ Equations.* 2010;35(7):1236-1275. doi:10.1080/03605300903419791
3. Sari MT, Susanti S. GAMBARAN KUALITAS HIDUP LANSIA DI PANTI SOSIAL TRESNA WERDHA BUDI LUHUR DAN LANSIA DI KELURAHAN PAAL V -KOTA JAMBI. *J Ilm Univ Batanghari Jambi.* 2017;17(2):178-183. doi:10.33087/JIUBJ.V17I2.371
4. Vieira ER, Palmer RC, Chaves PHM. Prevention of falls in older people living in the community. *BMJ.* 2016;353. doi:10.1136/BMJ.I1419
5. Ungar A, Rafanelli M, Iacomelli I, et al. Fall prevention in the elderly. *Clin Cases Miner Bone Metab.* 2013;10(2):91. doi:10.11138/ccmbm/2013.10.2.091
6. Nugraha MHS, Wahyuni N, Muliarta IM. THE PELATIHAN 12 BALANCE EXERCISE LEBIH MENINGKATKAN KESEIMBANGAN DINAMIS DARIPADA BALANCE STRATEGY EXERCISE PADA LANSIA DI BANJAR BUMI SHANTI, DESA DAUH PURI KELOD, KECAMATAN DENPASAR BARAT. *Maj Ilm Fisioter Indones.* 2016;4(1):1-12. doi:10.24843/MIFI.2016.V04.I01.P01
7. Munawwarah M, N PN. Pemberian Latihan pada Lansia dapat Meningkatkan Keseimbangan dan Mengurangi Resiko Jatuh Lansia. *Fisioter J Ilm Fisioter.* 2015;15(1):44. doi:10.47007/FISIO.V15I1.1118
8. Novianti IGASW, Jawi IM, Munawaroh M, Griadhi IPA, Muliarta M, Irfan M. LATIHAN JALAN TANDEM LEBIH MENINGKATKAN KESEIMBANGAN LANSIA DARIPADA LATIHAN BALANCE STRATEGY. *Sport Fit J.* Published online January 12, 2018:117-122. doi:10.24843/SPJ.2018.V06.I01.P15
9. Fernández-Argüelles EL, Rodríguez-Mansilla J, Antunez LE, Garrido-Ardila EM, Muñoz RP. Effects of dancing on the risk of falling related factors of healthy older adults: A systematic review. *Arch Gerontol Geriatr.* 2015;60(1):1-8. doi:10.1016/J.ARCHGER.2014.10.003
10. Scura D, Munakomi S. Tinetti Gait and Balance Test. *StatPearls.* Published online November 20, 2022.
11. Choi JH, Kim NJ. The effects of balance training and ankle training on the gait of elderly people who have fallen. *J Phys Ther Sci.* 2015;27(1):139-142. doi:10.1589/JPTS.27.139
12. Iswati. Balance Exercise Jalan Tandem Untuk Mengurangi Risiko Jatuh Pada Lansia. *J Penelit Ilmu Kesehat (Jurnal Pikes ).* 2021;2(1):42-48.
13. Montejano-Lozoya R, Miguel-Montoya I, Gea-Caballero V, Mármol-López MI, Ruíz-Hontangas A, Ortí-Lucas R. Impact of Nurses' Intervention in the Prevention of Falls in Hospitalized Patients. *Int J Environ Res Public Heal* 2020, Vol 17, Page 6048. 2020;17(17):6048. doi:10.3390/IJERPH17176048
14. Ong MF, Soh KL, Saimon R, Wai MW, Mortell M, Soh KG. Fall prevention

education to reduce fall risk among community-dwelling older persons: A systematic review. *J Nurs Manag.* 2021;29(8):2674-2688. doi:10.1111/JONM.13434