

The Effect Of Postural Control Exercise On Reducing The Risk Of Falls In Improving The Gait And Balance Of The Elderly At Yayasan Batara Hati Mulia Kabupaten Gowa

Tiar Erawan¹, Rahmat Nugraha²

¹Politeknik Kementerian Kesehatan Makassar, Indonesia

²Politeknik Kementerian Kesehatan Makassar, Indonesia

Coressponding e-mail: tiarerawan@poltekkes-mks.ac.id

Abstarct

The elderly is an advanced stage passed in the process of life in every human being which is characterized by a decrease in the ability and function of the body. Elderly people who experience balance disorders are a common problem. The problem that will arise from balance disorders is the risk of falling in the elderly. This study is Quasi Experimental with a pre test and post test control group design, aiming to determine the effect between the provision of tandem walking exercises and elderly gymnastics on reducing the risk of falls in the elderly. This research was conducted at Batara Hati Mulia Foundation, Gowa Regency. The sampling technique in this study is Purposive Sampling, which is the determination of samples of all members of the population used according to inclusion criteria, namely the elderly aged 60 years and over. The number of samples of 20 elderly people was divided into 2 groups, namely 10 elderly in the treatment group who were given postural control exercise and elderly gymnastics and 10 elderly in the control group were given elderly exercises. The measuring instrument used is the Time Up and Go Test (TUG). The results of the study based on paired sample t-test in the treatment and control groups were obtained ($p < 0.001$) for a decrease in the risk of falling which means there was a significant effect on reducing the risk of falling in the treatment group with a decrease of 6.5 seconds and the control group by 4.8 seconds. Based on the results of the independent t-test for reducing the risk of falling, a value of $p < 0.001$ was obtained, which means that there is a difference in the risk of falling between groups, it can be said that the provision of postural control exercise is better in reducing the risk of falling than the provision of elderly gymnastics. The conclusion of this study is that there is an effect of Postural control exercise and Elderly Gymnastics on reducing the risk of falling in the elderly.

Keywords: Postural Control Exercise, Elderly Gymnastics , Risk of Falling, Elderly

Introduction

Elderly (old age) is an advanced stage experienced in the life process of every human, characterized by a decline in both physical and psychological abilities and body functions. The elderly represent a population group in the final stage of the life cycle, where they are undergoing a process of change in physical, psychological, social, and cultural aspects, with an age exceeding or equal to 60 years (Suciana et al., 2018).

Postural control exercise is a form of training aimed at improving and maintaining body balance and posture control in the elderly. This exercise is intended to reduce the risk of falls among the elderly, which is often a serious concern for them (Sherrington, C., et al., 2019).

Elderly gymnastics is a light and easy-to-do exercise that is not burdensome and can be applied to the elderly. This physical activity helps the elderly to stay fit and fresh. This is because elderly gymnastics can train the bones to remain strong, encourage the heart to work optimally, and help eliminate free radicals in the body (Siti Munawaro et al., 2022).

The aim of this research is to determine the influence of postural control exercise and elderly gymnastics on reducing the risk of falls in the elderly, focusing on improving walking style and balance among the elderly in the Batara Hati Mulia Foundation in Gowa district.

Methods

This research employs a Quasi-Experimental design with a pre-test and post-test control group. The study consists of two groups: the treatment group using Postural Control Exercise and Elderly Gymnastics, and the control group using Elderly Gymnastics only. The research population includes all the elderly individuals in the Batara Hati Mulia Foundation in Gowa district. The research sample is a subset of the population that meets the inclusion criteria, selected through purposive sampling.

Inclusion and exclusion criteria include: individuals aged 60 and above, elderly who can walk independently without assistance, elderly at risk of falls verified by the Time Up and Go Test (TUG) score, elderly without neurological disorders such as stroke and Parkinson's, and those willing to participate as respondents. Excluded are elderly with physical disabilities, those using walking aids such as wheelchairs, walkers, and crutches, and those unwilling to participate in the research or sign an informed consent form.

Data collection involves direct observation at the research site regarding the methods to be used during the study. The researcher reviews relevant literature to formulate research problems and objectives. Subsequently, the researcher develops a conceptual framework, hypothesis, and determines the research design. During the implementation phase, the researcher selects the research population, i.e., the elderly at the Batara Hati Mulia Foundation in Gowa district based on the predetermined inclusion and exclusion criteria, resulting in the research sample. Before administering treatment, the researcher measures the risk of falls using the Time Up and Go Test as a pre-test.

After administering the treatment according to the predetermined dosage, the researcher conducts a post-treatment measurement of the risk of falls as post-test data in the study. Data analysis involves several tests: normality test of data using paired sample t-test to determine whether the data is normally distributed ($p > 0.05$) or not normally distributed ($p < 0.05$). Comparative analysis test (hypothesis test) is used based on the normality test results. If the data is normally distributed, parametric statistical tests such as the t-test are applied. If the data is not normally distributed, non-parametric statistical tests such as the Wilcoxon test are used.

Findings dan Discussion

Findings

Based on the SPSS calculation results, the homogeneity test yielded $p > 0.05$, indicating that the variance of characteristic data between groups is relatively similar, reducing its potential as a confounding variable for the intervention. Looking at the sample's age, both in the treatment and control groups, the average age is 66 years, with the youngest being 60 years and the oldest being 70 years. Regarding gender, in the treatment group, males and females are evenly distributed, each comprising 5 individuals (50%), while in the control group, females dominate, accounting for 7 individuals (70%).

The mean TUG scores for the treatment group are as follows: pre-test at 16.60 ± 1.35 and post-test at 10.10 ± 1.44 , with a mean difference of 6.50 ± 0.52 . This indicates a decrease in the risk of falls, with an average reduction of 6.50 after the intervention with Postural Control Exercise and Elderly Gymnastics. For the control group, the mean TUG scores are as follows: pre-test at 16.60 ± 1.26 and post-test at 11.80 ± 1.22 , with a mean difference of 4.80 ± 0.91 . This also signifies a decrease in the risk of falls, with an average reduction of 4.80 after the intervention with Elderly Gymnastics.

The TUG scores are then categorized according to Nurmalasari et al. (2018), where a TUG score >14 is classified as a high risk of falls, and a TUG score ≤ 14 is classified as a low risk of falls. In both the treatment and control groups, the pre-test falls into the high-risk category, while the post-test shifts to a low risk of falls for all samples in both the treatment and control groups.

Discussion

Showing the results of the paired sample t-test for TUG pre and post-tests in tandem walking and elderly gymnastics. The average TUG pre-test score is higher than the TUG post-test score, with an average difference of 6.5 seconds. The higher the TUG score, the greater the risk of falls in the elderly. The statistical test results indicate a $p\text{-value} < \alpha 0.05$, signifying a significant difference in TUG scores before and after postural control exercise and elderly gymnastics. Therefore, it can be concluded that postural control exercise and elderly gymnastics can reduce the risk of falls in the elderly by 6.5 seconds.

Based on research conducted by Siregar et al. (2020) titled "The Effect of Postural Control Exercise on Elderly's Body Balance to Reduce the Risk of Falling," the study found that elderly individuals with walking balance disorders can be improved through muscle strengthening exercises such as tandem walking. Tandem walking can enhance muscle strength in the quadriceps muscle area, responsible for straightening the knee and flexing the hip. This exercise improves balance, playing a role in reducing the risk of falls in elderly individuals through eccentric motion, amortization phase, and concentric shortening phase. The stretching and shortening cycle is intended to strengthen the elastic nature of muscle connective tissues, thereby increasing muscle strength during eccentric and concentric contractions.

According to a study by Astriani et al. (2020) titled "The Effects of Postural Control Exercise on the Risk of Falling in The Elderly," the results indicate that postural control exercise can increase muscle strength in the front thigh muscles, responsible for straightening the knee and flexing the hip. Postural control exercise also affects Medial/Lateral walking relationships, controlling the ankle, investment/everstor mechanism, and dominant load/unload muscles from hip abduction and adduction. In the AP condition, tandem walking increases hip extensor and flexor, training sensory and motor skills to maintain balance from a neuro control perspective.

In a study by Syah et al. (2017) titled "The Effect of Elderly Gymnastics and Postural Control Exercise in Improving Body Balance," the research concludes that tandem walking, observed in foot movements and pressure distribution on the sole of the foot, can be beneficial. In cases of cerebellar disorders or vestibular weakness, corrective small movements are normal, indicating that individuals can perceive received proprioceptive input. Proprioceptive exercises involve slow movements in every motion and position change, allowing subcortical nuclei and basal ganglia to analyze position sensations and provide feedback in the form of expected muscle contractions. Subsequently, this exercise is adapted as a new functional stability. Elderly individuals with decreased motor activity are assisted in improving balance by enhancing proprioceptive responses, which can increase joint stability.

Based on the theory presented by the American College of Sports Medicine (2011), exercises that increase muscle strength, ultimately improving postural balance in the elderly, can be conducted for 3 weeks with a frequency of 2 times a week. Postural control exercise is a physical activity that, when performed regularly, enhances strength and agility, prevents falls in the elderly, and improves the health and independence of the elderly in daily activities. This aligns with Dewi's statement (2014) that physical activity is any body movement requiring sufficient energy.

The above-described effects of postural control exercise intervention demonstrate its level of effectiveness in reducing the risk of falls and improving balance in the elderly. Postural control exercise can enhance lateral postural balance, playing a role in reducing the risk of falls in older age. The goal is to train the proprioceptive system, focusing on posture or position. Exercises that increase muscle strength, ultimately improving postural balance in the elderly, can be conducted for 5 weeks with a frequency of 3 times a week. Regular tandem walking exercises contribute to strength, agility, fall prevention, improved health, and independence in daily activities for the elderly. Planned, structured, and repeated physical activities are referred to as sports, which involve controlling balance, muscle coordination, and body movements.

Based on research conducted by Veni Fatmawati (2020) titled "The Influence of Elderly Gymnastics on Reducing the Risk of Falling in the Elderly," the results prove that elderly gymnastics reduces the risk of falls. This gymnastics consists of movements involving almost all muscle groups, has recreational elements, and its implementation technique is flexible, allowing it to be performed in both open and closed spaces. Additionally, physiologically, some elderly gymnastics movements involve the lower limbs, arms, and trunk, leading to increased muscle contraction that aids and maintains the body. This study's results also align with

research by Siti Munawaro et al. (2022), stating that elderly gymnastics has a positive effect on body balance. Good body balance can help prevent falls in the elderly.

Conclusion

Based on the objectives and research findings, the conclusions are as follows: The provision of Postural Control Exercises and Elderly Gymnastics has a significant effect on reducing the risk of falls in the elderly at the Batara Hati Mulia Foundation in Gowa Regency. The provision of Elderly Gymnastics also has a significant effect on reducing the risk of falls in the elderly at the Batara Hati Mulia Foundation in Gowa Regency. There is a significant difference in the effects of Postural Control Exercises and Elderly Gymnastics on reducing the risk of falls in the elderly at the Batara Hati Mulia Foundation in Gowa Regency.

It is recommended that physiotherapists at the Batara Hati Foundation and those practicing independently in handling the elderly consider utilizing both interventions. To reduce the risk of falls in the elderly, it is suggested that physiotherapists use the findings of this research as one of the physiotherapy intervention programs for reducing the risk of falls in the elderly. Further research is needed regarding postural control exercises and elderly gymnastics in reducing the risk of falls in the elderly, with a larger sample size to optimize the research results..

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References

- Astriani, N. Dewi, P. Suandayan, A, I. Putra, M. Dan Yudiastu I. (2020). The Effects Of Tandem Stance Therapy On The Risk Of Falling In The Elderly, *Jurnal Keperawatan Global*. 5(2), 1-5
- Ferrari, R. (2015).
- Cruz-jimenez, M. (2017). Normal changes in gait and mobility problems in the elderly. *Physical Medicine and Rehabilitation Clinics*, 28(4), 713–725.
- Dady, F., Memah, H. P., & Kolompoy, J. A. (2020). Hubungan Bahaya Lingkungan dengan Risiko Jatuh Lanjut Usia di BPLU Senja Cerah Manado. *Jurnal Persatuan Perawat Nasional Indonesia (JPPNI)*, 3(3), 149–156.
- Deniro, A. J. N., Sulistiawati, N. N., & Widajanti, N. (2017). Hubungan antara Usia dan Aktivitas Sehari-Hari dengan Risiko Jatuh Pasien Instalasi Rawat Jalan Geriatri The Relationship between Age and Activity of Daily Living with. 4(4), 199–203
- Dewi, S.R. (2014). *Buku Ajar Keperawatan Gerontik*. Yogyakarta: Deepublish.
- Ekasari, M. F., Riasmini, N. M., & Hartini, T. (2018). Meningkatkan Kualitas Hidup Lansia Konsep dan Berbagai Intervensi. *WINEKA MEDIA*.
- Fristantia, D. A., Zulfritri, R., & Hasneli, Y. (2017). Analisis Faktor-faktor yang berhubungan dengan Risiko Jatuh pada Lansia yang tinggal di Rumah. Universitas Riau.
- Fruth, S. J. (2021). *Fisioterapi Pemeriksaan dan pengukuran*. Penerbit buku kedokteran EGC.
- Idris, esi N. T., & Kurnia, E. (2017). Faktor Alat Bantu Jalan Dengan Resiko Jatuh Pada Lansia Di Posyandu Lansia Rw 04 Kelurahan Bangsal Kota Kediri. *Jurnal STIKES*, 10(2), 139–147.
- Joo, B., Marquez, J. L., Osmotherly, P. G. (2022). Tes sikap tandem sepuluh detik: alat potensial untuk membantu resep alat bantu jalan dan risiko jatuh pada individu yang mengalami gangguan keseimbangan. *Arsip Penelitian Rehabilitasi dan Terjemahan Klinis*, 4(1), 100173.

- Kholifah, S. N. (2016). Keperawatan Gerontik. Jakarta: Kementerian Kesehatan Republik Indonesia: Pusat Pendidikan Sumber Daya Manusia Kesehatan Bidang Pengembangan Dan Pemberdayaan Sumber Daya Manusia Kesehatan, 105.
- Lintin, G. B. R., & Miranti. (2019). Hubungan Penurunan Kekuatan Otot Dan Massa Otot Dengan Proses Penuaan Pada Individu Lanjut Usia Yang Sehat Secara Fisik. *Healthy Tadulako Journal (Jurnal Kesehatan Tadulako)*, 5(1), 1–5.
- M. (2017). Difference Level of Body Balance Between Elderly Men and Women. *Nursing News*, 2(1), 454–461.
- Mardiasyah, Hardianto, Y., & Amalia, R. N. (2022). Hubungan antara kemampuan Aktivitas Fungsional dan Resiko Jatuh pada Lansia di Yayasan Batara Hati Mulia Kabupaten Gowa The Relationship Between Fungsional ACTIVITY Capability and Fall Risk Among Elderly In Batara Hati Mulia Foundation, Gowa Regency. *Jurnal Fisioterapi Dan Rehabilitasi*, 6 (1), 24–30.
- Nugroho, W. 2008. Keperawatan Gerontik dan Geriantrik Edisi 3. Jakarta : EGC.
- Nugrahani, N, 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) 87-97
- Nurmalasari, M., Widajanti, N., & Dharmanta, R. S. (2018). Hubungan Riwayat Jatuh dan Timed Up and Go Test pada Pasien Geriatri. 5(4), 164–168.
- Park, S. H. (2018). Tools for assessing fall risk in the elderly : a systematic review and meta-analysis. *Aging Clinical and Experimental Research*.
- Raditya Kurniawan Djoiar, A. P. M. A. (2021). Geriatri 2. Penerbit Syiah Kuala University Press.
- Rahmawati, F., Mustafidah, N., & Annisa, L. (2019). Prevalensi Penggunaan Fall 65 Universitas Hasanuddin Risk Medicine pada Pasien Lanjut Usia di Instalasi Rawat Jalan Rumah Sakit Madiun. *Jurnal Manajemen Dan Pelayanan Farmasi (Journal of Management and Pharmacy Practice)*, 9(2), 135–142.
- Ringo, R. M. S. (2018). The Relationship of Elderly Body Balance Gymnastics to the Risk of Falling in the Elderly at Uptd Griya Wredha Jambangan (Doctoral dissertation, Merdeka University).
- Rudy, A., & Setyanto, R. B. (2019). Analisis Faktor Yang Mempengaruhi Risiko Jatuh Pada Lansia. *Jurnal Ilmiah Ilmu Kesehatan: Wawasan Kesehatan*, 5(2), 162–166.
- Syah, I. Purnawati, S. Dan Sugijanto (2017). Efek Pelatihan Senam Lansia Dan Latihan Jalan Tandem Dalam Meningkatkan Keseimbangan Tubuh Lansia Di Panti Sosial Tresna Kasih Sayang Ibu Batusangkar Sumatera Barat, *Sport And Fitness Journal*. 5(1) 8- 16
- Sari, N. I. A. A. (2018). Hubungan antara aktivitas fisik dengan kebugaran (six minute walking test) pada lansia di posyandu lansia permadi dinoyo kota malang.
- Sherrington, C., et al. (2019). Exercise to prevent falls in older adults: an updated systematic review and meta-analysis. *British journal of sports medicine*, 53(3), 175-184.
- Siti Munawaroh, Muhammad Raditia Septian, Desy Kurniawati Tandiyo (2022). Senam Menurunkan Risiko Kejadian Jatuh Pada Lansia.
- Siregar, R., Gultom, R., & Sirait, I. I. (2020). Pengaruh Latihan Jalan Tandem terhadap Keseimbangan Tubuh Lansia untuk mengurangi Resiko Jatuh di UPT Pelayanan Sosial Lanjut Usia Binjai Sumatera Utara. *Jurnal Teknologi dan Kedokteran Kesehatan*, 6(1), 318- 326.
- Suciana, F., Handayani, S. and Ramadhani, I. N. (2018) ‘Pengaruh Senam Bugar Lansia Terhadap Penurunan Resiko Jatuh Pada Lansia’, *Jurnal Ilmiah Kesehatan*, XI(I), pp. 313–320.
- Suroto. (2004). “Buku Pegangan Kuliah Pengertian Senam, Manfaat Senam Dan Urutan Gerakan”. Semarang: Unit Pelaksana Teknis Mata Kuliah Umum Olahraga Undip.
- Sunaryo, M. K., Rahayu Wijayanti, S. K., Kep, M., Kom, S., Kuhu, M. M., SKM, M., ... & Kuswati, A. (2016). Asuhan keperawatan gerontik. Penerbit Andi. Keseimbangan.
- Sumintarsih. (2006). “Kebugaran Jasmani Untuk Lansia. Olahraga”, 147-160.
- Utami, B. R. (2017). Hubungan Antara Kekuatan Otot Tungkai Dengan Risiko Jatuh Pada Lanjut Usia Di Desa Jaten Kecamatan Juwiring Klaten. Surakarta.
- US Cencus Bureau. (2018). Berapa Jumlah Penduduk Dunia. berapa-jumlah-66 Universitas Hasanuddin penduduk-dunia.
- Veni Fatmawati, Emi Yuliani ,Riska Risty Wardani, (2020). Pengaruh Senam Lansia Terhadap Penurunan Resiko Jatuh Pada Lansia di Universitas’Aisyiyah Yogyakarta Mlangi Nogotirto, Jl. Siliwangi Jl. Ringroad Barat No.63, Area Sawah, Nogotirto, Kec. Gamping, Kabupaten Sleman, Daerah Istimewa Yogyakarta 55592

- Vincenzo, J. L., & Patton, S. K. (2021). Pengalaman orang dewasa yang lebih tua dengan rekomendasi pencegahan jatuh yang berasal dari STEADI. *Praktik Promosi Kesehatan*, 22(2), 236-247.
- Widianti, A. T. dan Proverawati. A. (2010). *Senam Kesehatan*. Yogyakarta: Nuha Medika.