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Effect of Balance Excercise on Reducing the Falling Risk in Elderly

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***ABSTRACT*---** The elderly is a group of people who lived a processes of life that has a longer time to adapt to the environtment so it is potentially a declining in all the body's ability. This declining led to the balance reduction, including the postural balances such as falling risk. Fall can lead to various kinds of injuries, physical and psychological damage. To overcome and prevent any balance disorders is attempted administration of exercises, one of which is a balance exercise. Balance excercise is very effective for improving functional and static balance and mobility of the elderly. This balance exercise will also reduce the frequency of falls in the elderly, if done with an optimal frequency 3 times a week for 3 weeks it can significantly improve postural stability. To know that balance excercise can reduce the falling risk in elderly. The design of this study used one group pretest-posttest design with population of the elderly in the Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara. The method using simple random sampling, data collection using Berg Balance Scale dan tested using the wilcoxon test. **Result:** Before doing balance exercise most of the respondents were included in the risk of Moderate fall is about 31 people (75.61%). After doing balance exercise most of the respondents were at the risk of Moderate fall is about 35 people (85.37%). The result of study was obtained (ρ=0,000). There is an effect of balance exercise on reducing the falling risk in the eldery at Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara. Nurses are expected to be able to teach the eldery about balance exercise theraphy in order to reduce the falling risk.

***Keywords*---**Balance exercise, Eldery, Falling risk.

I. INTRODUCTION

According to the US Department of Population (1999), the population of the elderly aged 60 years or more is estimated at nearly 600 million people and is projected to be 2 billion by 2050, at that time the elderly will outnumber the population of children (0-14 years) (Kinsella & Taeuber, 1993 in Siti *et al.*, 2011). In 2000 the number of elderly in Indonesia is projected at 7.28% and in 2020 amounted to 11.34% (CBS, 1992). Even the data of the US Census Bureau estimates that Indonesia will experience the largest amount of elderly throughout the world in the years 1990-2025, amounting to 414% (Kinsella & Taeuber, 1993 in Siti *et al.*, 2011; Ketut Widana *et al.*, 2020).

The population projection by the Central Bureau of Statistics illustrates that between 2005-2010 the number of elderly will be equal to the number of children under five, which is around 19 million people or 8.5% of the total population (Siti *et al.*, 2011; Mustika & Sudiantara, 2019; Paramita *et al.*, 2018; Mustika & Harini, 2017).

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According to data from the Public Health Office of West Nusa Tenggara Province in 2018 from January to June shows that the total elderly of West Nusa Tenggara Province is 222,472 people, where the number of elderly in Mataram City is 15,627 people (Public Health Office of West Nusa Tenggara Province, 2018).

According to preliminary studies it is known that the elderly in Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara there are 71 people, 20 are men and 51 are women. Of these, 30 people had falls and 41 others nearly fell due to balance problem. Then the results of interviews with nurses or caretaker at the Eldery Social Center of Mandalika (BSLU) found that physical exercise such as elderly exercise is routinely carried out twice a week, on Tuesdays and Saturdays, but there are remain elderly who has balance problem and falling risk. The elderly is a group of people who lived a processes of life that has a longer time to adapt to the environtment so it is potentially a declining in all the body's ability. Furthermore, it would cause various problems which will affect various groups in the population, including their families (Ceranski, 2006 and Setiabudhi, 1999 in Rahayu & Masitoh, 2013).

The length of adaptation the elderly had is a degeneration process that will cause setbacks and changes in all the systems. Specifically, changes in the neuromuscular system will affect changes in muscle function, which is decreasing muscle's strength and contraction, muscle's elasticity and flexibility as well as the speed and time of reaction. This lead to decreasing the balances, including postural balance (Ceranski, 2006 in Rahayu & Masitoh, 2013; Albán *et al.,* 2019; Sofija & Ivan, 2018; Surya, 2019). This decreased balance causing daily physical problems that experienced by the elderly, such as the falling risk. The falling risk caused by the weakening of the elderly's muscles. About 30-50% of the population aged up to fall each year. Half of these numbers have fallen repeatedly. Women are more often falls compared to men (Ceranski, 2006 in Rahayu & Masitoh, 2013; Mataram *et al.,* 2020; Lestari *et al.,* 2016; Nyandra *et al.,* 2018).

Falling can lead to various kinds of injuries, physical and psychological damage. The most feared of physical damage from falls is a hip fracture. Even though physical injury doesn't happens, aftershock that follow and fear of falling again can have many consequences including anxiety, lossing of self-confidence, restrictions on daily activities, phalaphobia or falling phobias. The elderly who have experienced falls and received treatment in hospital, has the possibility of death (Stanley, 2007 in Nurkuncoro & Suratini, 2015). As if through the fall's impact, prevention of falls in the elderly is an effort that needs to be done because if it's done, it will definitely cause complications, although it mild but still burdening the elderly's condition (Darmojo & Martono, 2004; Nalini *et al.,* 2018; Jain *et al.,* 2019).

Good, correct, measured, and regular physical exercise (BBTT) and exercises that are suitable with health level, physical activity level, and fitness level of each individual could reduce the risk of bone disorders that cause the falling risk in the elderly (Tobing, 2011 in Nurkuncoro & Suratini, 2015).

The results of interviews with nurses or caretaker at the Eldery Social Center of Mandalika (BSLU) found that physical exercise such as elderly exercise is routinely carried out twice a week, on Tuesdays and Saturdays, but it's not specific to the balance excercise on reducing the falling risk in the elderly. The solution to overcome and prevent any balance problem is by giving the exercises, one of it is a balance exercise. Conveyed by Nyman *et al.* 2007 in Rahayu & Masitoh, 2013, that the balance exercise is a physical activity to increase body's stability by increasing the strength of the muscles of the lower limbs.

Meanwhile, according to Madureira & Rodrigues (2006) and Skelton (2001) in Rahayu & Masitoh, (2013), revealed that balance excercise is very effective to improve functional and static balance and mobility of the elderly. This balance exercise will also reduce the frequency of falls in the elderly, if done with an optimal frequency 3 times a week for 3 weeks it can significantly improve postural stability. As it seen it's very interesting to find out more phenomena that happens in the elderly's postural balance after give them the balance exercise.

II. PURPOSE

1) General Purpose

The general purpose of this study is to know that balance excercise can reduce the falling risk in elderly at Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara.

2) Particular Purpose

1) To identified the falling risk before doing the balance excercise.
2) To identified the falling risk after doing the balance excercise.
3) To analyzed the effect of balance exercise on reducing the falling risk.

III. METHOD

The design of this study was a pre-experimental pre posttest design. The population in this study is the elderly who are in the Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara**.** The samples in this study is amounted of 41 elderlies. The sampling technique in this research is *Simple Random Sampling*. The data collectioning using the *Berg Balance Scale.* And tested using the *Wilcoxon Sign Rank Test.*

IV. RESULT AND DISCUSION

Results in this study starts from the general characteristics of the respondents, as follows:

1) Distribution of Respondents by Gender

Table 1: Distribution of Respondents by Gender at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Genders	Amount	Percentage
1	Woman	24	58,54
2	Man	17	41,46
Total		41	100

2) Distribution of Respondents by Age

Table 2: Distribution of Respondents by Age at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Age	Amount	Percentage
1	60-74	20	48,78

2	75-90	21	51,22
Total		41	100

3) Distribution of Respondents by Occupation

Table 3: Distribution of Respondents by Occupation at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Occupation	Amount	Percentage
1	Unemployed	41	100
2	Corporated	-	-
3	TNI/POLRI	-	-
4	Cultivator	-	-
Total		41	100

4) Distribution of Respondents by Education

Table 4: Distribution of Respondents by Education at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Education	Amount	Percentage
1	No Formal Education	38	92,68
2	Primary Education	3	7,32
3	Secondary Education	-	-
4	Above Secondary Education	-	-
Total		41	100

Results in this study before and after giving The Balance Exercise using the Berg Balance Scale, results are as follows:

1) Fall Risk On the Elderly Before Giving Balance Exercise

Table 5: Fall risk on the elderly before giving balance exercise at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Fall Risk Category	Amount	Percentage
1	Low	2	4,88
2	Moderate	31	75,61
3	High	8	19,51

Total	41	100

2) Fall Risk On the Elderly After Giving Balance Exercise

Table 5: Fall risk on the elderly after giving balance exercise at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Fall Risk Category	Amount	Percentage
1	Low	5	12,19
2	Moderate	35	85,37
3	High	1	2,44
Total		41	100

3) The Effect of Balance Excercise On Reducing the Falling Risk in Elderly at Eldery Social Center of Mandalika in West Nusa Tenggara can be seen in the following table:

Table 6: The Effect of Balance Excercise On Reducing the Falling Risk in Elderly at Eldery Social Center of Mandalika in West Nusa Tenggara on April 27 – Mei 10 2019 (n=41).

No	Fall Risk Category	Pre		Post		Mean rank	*Asmp. Sig*
		Amount	%	Amount	%		
1	Low	2	4,88	5	12,19	0,00	0,000
2	Moderate	31	75,61	35	85,37		
3	High	8	19,51	1	2,44		
Total		41	100	41	100		

Based on the results of the research on 41 respondents, it showed that before giving the intervention of balance exercise respondents who has the low falling risk are 2 people (4.88%), moderate falling risk are 31 people (75.61%), and high falling risk are 8 people (19, 51%). By the elderly that has been observed, most of them were female, which were 24 people (58.54%), this is strengthened by Utomo's (2010) which shows that gender also affected the joint flexibility. Women's joint is more flexible than men because their bones are smaller and their muscles are less than men, the smaller bone size causes stiffness and decreased of the strength, this lead to osteoporosis which can subsequently causing pain, deformity and fracture.

Most of the observed elderly were aged 76-90 years, which was 21 people (51.22%), this was also strengthened by Jowir's (2012) that the muscle's strength is the strength when a muscle or group of muscles is developed to be able to hold the resistance with maximum attempt. Muscle's strength is an important thing for everyone, because muscle's strength is a driving force of movement in completing tasks. After 30 years, humans will lose approximately 3-5% of muscle's tissue per decade. Muscle strength will gradually decrease along with the age. Decreasing muscle's function and strength will lead in decreasing the ability to maintain body's balance, detention in the motion of sitting to standing, increasing the falling risks and posture's changes. Lots of factors can cause the falls. These include sensory, central nervous system, cognitive, and musculoskeletal. Falls can also be

caused by accidents, vertigo, orthostatic hypotension, drugs, syncope, ill-lit room lighting, slippery floors, and unfamiliar environments (Darmojo & Martono, 2004).

Before giving the balance exercise, the elderly's balance is very unstable and often to falls due to imbalance in the elderly's body, so that by studying and practicing the balance exercise will reduce or decrease the falling risk. Balance exercise will improve the postural balance of the elderly, giving the effect of increasing the strength of the muscles of the lower limb. After the intervention of balance exercise the data obtained at low falling risk are 5 people (12.19%), moderate falling risk are 35 people (85.37%), and at high falling risk is 1 person (2.44%).

This is in line with the theory of Tilarso (1988) which explains that balance exercise is a method for increasing muscle's strength and increasing balance to reduce the falling risk. Balance exercise is a procedure for increasing muscle's strength through 5 movements, by providing movements or exercises that involve muscle's contraction that can increase the muscle's strength, decreasing in size and strength of the muscles of the elderly due to degeneration can also be reduced by regular exercise (Tilarso, 1988). This is evidenced in the research of Anis (2013) which shows changes in increased muscle's strength of the elderly. Balance exercise is very important to the elderly because this exercise is very helpful ton maintaining a stable body so it prevent falls that often they had (Jowir, 2012).

Balance exercise is useful to improve postural balance, reduce the falling risk in the elderly and have an effect on increasing the strength of the lower limb's muscles (Nyman *et al.* 2007 in Anis, 2013). After physiologically giving the balance exercise, it can generate a muscular contraction effect in every movement of the exercise so that it can maintain the postural balance of the elderly and reduce the falling risk. The falling risk in the elderly at Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara after giving the balance exercise intervention shows that by using the statistical analysis of Wilcoxon Sign Rank Test with $\alpha = 0.05$ analysis obtained $\rho = 0{,}000$ and $\alpha = 0.05$ which means H_o is rejected and H_a is accepted, which means there is an effect of balance exercise on reducing the falling risk in the elderly at Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara. As the researcher has discovered, the elderly who doned the balance exercise regularly will have lower falling risk because there is an additioning of muscle's strength when doing balance exercise. Balance exercise involves muscle's contraction so that it can increase muscle's strength and reduce the reduction of muscle's size in the elderly due to degeneration.

Balance exercise is a physical activity that is need to be done to increase the stability of the body by increasing the muscle strength of the limbs, especially the lower limb (Glenn, 1995 in Anis, 2013). According to Glenn (1995) balance exercise itself consists of several movements that can affect the muscles such as plantar flexion movements that affect the lateral calf muscles, the surface and inner calves of dorsal muscles, hip flexion's movements that affect the ventral groin muscles, medial muscles of the upper thighs and hip dorsal, hip extension's movements that affect the medial muscles of the upper thighs and hip dorsal, knee flexion's movements that affect the ventral thigh muscles, medial thighs, hip dorsal, the surfaces and inner parts of dorsal calf, as well as on the side leg raise's movements that affect the ventral muscles thighs and dorsal hips.

The form of balance exercise that has been arranged is also allows to give the effect to on visual system, vestibular, somatosensory, and muscular. When muscles start its contraction, a process of protein synthesis follows in the muscle contractile which takes faster than the destroyer. There are certain things follows which is the actin and myosin filaments in the myofibril will be multiplied progressively. Furthermore, the myofibrils become

hypertrophy. The hypertrophic fibers will increase the components of the postpagen metabolic system including ATP and postpokreatin, in effect there will be the addition of ability of the aerobic and anaerobic metabolic systems that are able to increase the energy and muscle's strength. This muscle's strength addition will make the body stronger to sustain it, as well as in maintaining it's movements (Rahayu & Masitoh, 2013). This will make the elderly more balanced.

The results of this study are accord with what was conveyed by Nyman (2007) in Rahayu & Masitoh, (2013), that balance exercise is a physical activity to increase body's stability by increasing the muscle's strength of the lower limbs. Whereas Madureira & Rodrigues (2006) in Rahayu & Masitoh, (2013), revealed that balance exercise is very effective in improving functional and static balance and mobility of the elderly. Even though the elderly doned the balance exercise has increase in muscle's strength, but there are some elderly who remain or don't has it. This can be affected by various factors, due to unsustainable diet and obesity eventually gave a heavy burden on joints or muscle's strength.

V. CONCLUSION

Based on the results of the study the falling risk in the elderly before doing balance exercise is at the low falling risk are 2 people (4.88%), at moderate falling risk are 31 people (75.61%), and at high falling risk are 8 people (19.51%). The falling risk in the elderly after doing balance exercise is at low falling risk are 5 people (12.19%), at moderate falling risk are 35 people (85.37%), and at high falling risk is 1 person (2.44%). Which means that there is an effect of balance exercise on reducing the falling risk in the elderly at the the Eldery Social Center of Mandalika (BSLU) in West Nusa Tenggara.

REFERENCES

1. Albán, W. E. M., Ruperti, M. J. B., Tumbaco, D. E. S., & Martínez, M. E. M. (2019). Brain and emotions on learning process. International Journal of Health & Medical Sciences, 3(1), 17-20. https://doi.org/10.31295/ijhms.v3n1.108

2. Anis, K. (2013). Konsep Balance Exercise.
3. Ceranski, S. (2006). Fall prevention and modifiable risk factor. It'sa Wonderful Life Aging with Developmental Disabilities.

4. Darmojo, R. B., & Martono, H. H. (2004). Geriatri (ilmu kesehatan usia lanjut). Edisi ke-3. Jakarta: Balai Penerbit FKUI.
5. Dinas Kesehatan Provinsi NTB. 2018. Peningkatan Jumlah Lansia Di Provinsi Nusa Tenggara Barat.
6. Glenn, J. T. (1995). U.S. Patent No. 5,406,261. Washington, DC: U.S. Patent and Trademark Office.
7. Jain, P., Agarwal, R., Raikwar, V. L., & Khare, J. (2019). Introduction to satellite education on quality management. International Journal of Life Sciences & Earth Sciences, 2(1), 1-4. https://doi.org/10.31295/ijle.v2n1.67

8. Jowir, Rico. 2012. Latihan Keseimbangan from http//seripakyu,blogspot.com/2012/04/latihan

keseimbangan.html accessed on Juni 24, 2019.

9. Ketut Widana, I., Wayan Sumetri, N., Ketut Sutapa, I. and Suryasa, W. (2020). Engineering System of Research Master Plan for Better Cardiovascular and Musculoskeletal Health Quality. Comput Appl Eng Educ. https://doi.org/10.1002/cae.22202
10. Kevin, K., & Taeuber, C. M. (1993). An Aging World: International Population Reports. Washington DC: US Government Printing Office, 92-95.
11. Lestari, A. S., Adiputra, N., Manuaba, I. A., & Sutjana, I. D. P. (2016). Access to personal hygiene improves the quality of life at elderly hostels. International Research Journal of Engineering, IT & Scientific Research, 2(11), 22-28.
12. Madureira, C., & Rodrigues, M. (2006). Public Administration of the 21st century: Organizational learning, behavioral change and administrative reform. Organizational behavior and management , 12 (2), 153-171.
13. Mataram, I. K. A., Antarini, A. A. N., & Agustini, N. P. (2020). Molatisu implementation increasing integrated health post cadre skills under five years old related balance menu preparation. International Journal of Health Sciences, 4(1), 8-17. https://doi.org/10.29332/ijhs.v4n1.397
14. Mustika, I. W., & Harini, G. A. (2017). Increasing education of family support for decreasing depression level towards elderly. International Journal of Health Sciences, 1(3), 10-16. https://doi.org/10.21744/ijhs.v1i3.46
15. Mustika, I. W., & Sudiantara, K. (2019). Effects of health promotion with family approaches on blood pressure and headache toward elderly. International Journal of Health Sciences, 3(3), 8-16. https://doi.org/10.29332/ijhs.v3n3.344
16. Nalini, M., Balaji, V., & Gayathiri, R. (2018). Blood glucose regulation using labview. International Journal of Chemical & Material Sciences, 1(1), 1-6. https://doi.org/10.31295/ijcms.v1n1.2
17. Nurkuncoro, Irawan Danar, and Suratini Suratini. (2015). "Pengaruh Latihan Keseimbangan terhadap Risiko Jatuh pada Lansia di Panti Sosial Tresna Werdha Yogyakarta Unit Budhi Luhur Kasongan Bantul." PhD diss., STIKES'Aisyiyah Yogyakarta.
18. Nyandra, M., Kartiko, B.H., Susanto, P.C., Supriyati, A., Suryasa, W. (2018). Education and training improve quality of life and decrease depression score in elderly population. Eurasian Journal of Analytical Chemistry, 13(2), 371-377.
19. Nyman, H., Adde, M., Karjalainen-Lindsberg, M. L., Taskinen, M., Berglund, M., Amini, R. M., ... & Leppä, S. (2007). Prognostic impact of immunohistochemically defined germinal center phenotype in diffuse large B-cell lymphoma patients treated with immunochemotherapy. Blood, The Journal of the American Society of Hematology, 109(11), 4930-4935.
20. Paramita, D. P., Adiatmika, I., Kuswardhani, T., & Mustika, I. W. (2018). Physiological and psychosocial change and the need of health intervention model for elderly. International Journal of Health Sciences, 2(2), 61-67. https://doi.org/10.29332/ijhs.v2n2.160
21. Rahayu, U. B., & Masitoh, I. (2013). Fenomena balance exercise untuk meningkatkan keseimbangan postural lanjut usia.
22. Setiabudhi, T. (1999). Panduan Gerontologi. Jakarta: Gramedia.

23. Siti, M., Mia, F. E., Rosidawati, J. A., & Batubara, I. (2008). Mengenal usia lanjut dan perawatannya. Jakarta: Penerbit Salemba Medika.
24. Skelton, C. (2001). Schooling the boys (pp. 199-217). Buckingham: Open University Press.
25. Sofija, G., & Ivan, T. (2018). Quality of life in children with disabilities placed in foster families. International Journal of Health & Medical Sciences, 1(1), 18-27. https://doi.org/10.31295/ijhms.v1n1.35
26. Stanley, R. P. (2007). Combinatorics and commutative algebra (Vol. 41). Springer Science & Business Media.
27. Surya, I. P. A. K. (2019). Chemical on pleurotusostreatus. International Journal of Chemical & Material Sciences, 2(1), 8-13. https://doi.org/10.31295/ijcms.v2n1.72
28. Tilarso, H. (1988). Latihan Fisik dan Usia Tua. CDK, 48, 19-21.
29. Tobing, E. (2011). Public health spending, tax reform, and long-run growth. Economics Letters, 112(1), 119-121. https://doi.org/10.1016/j.econlet.2011.03.020
30. Utomo, B. (2010). Hubungan antara kekuatan otot dan daya tahan otot anggota gerak bawah dengan kemampuan fungsional lanjut usia (Doctoral dissertation, UNS (Sebelas Maret University)).