RELATIONSHIP BETWEEN MUSCLE STRENGTH AND STRESS IN THE ELDERLY IN BANJAR SAMU, SINGAPADU KALER, SUKAWATI, GIANYAR, BALI

Fajarina Lathu Asmarani^{1*)}, Rizky Erwanto² & I Made Setia Suryawan³

^{1,2,3} Program Studi Keperawatan Program Sarjana Fakultas Ilmu Kesehatan Universitas Respati Yogyakarta

Abstract

One of the disorders in the elderly is stress. The stress elderly will have an impact on health. Stress elderly can arise because in the elderly there are changes in body composition, muscles, bones, and joints. The preliminary study showed that from 6 elderly, all elderly experienced a decrease in leg muscle strength. 2 elderly experienced mild stress. The purpose of this study was to determine the relationship between muscle strength and stress in the elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali. This research is non-experimental quantitative research with an analytical observational method with a cross-sectional design. The sample of this study was the elderly, as many as 46 elderly. It used the total sampling technique. Data collection tools using a questionnaire and chair stand test. Data analysis used Fisher Exact analysis. The statistical test of the relationship between muscle strength and stress showed a p-value of 0.009 <0.05. The majority of the elderly have abnormal muscle strength, namely 33 people or 71.7%, the majority of the elderly have normal stress levels, namely 33 people or 71.7%. There is a significant relationship between muscle strength and stress in the elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali.

Keywords: Elderly; Muscle strength; Stress

Article info: Sending on February 21, 2022; Revision on July 15, 2022; Accepted on July 25, 2022

*) Corresponding author:

E-mail: fajarinalathu@respati.ac.id

1. Introduction

Humans will naturally experience aging where the body slowly loses the ability of tissues to repair themselves. An old person known by the name of an elderly is more than 60 years old according to Law No. 13 of 1998. The elderly are one part of the process of human growth and development (Kusumawardani & Andanawarih, 2018). Indonesia experienced an aging population in 2019 where the number of elderly increased to 27.5 million people or 10.3%, which is estimated to be 57.0 million people or 17.9% in 2045 (Cicih, 2019). The March 2019 Susenas data shows that Bali is the 5th province with the highest number of elderly population in Indonesia in 2019 with a figure (11.30%). (Suhariyanto, 2019).

The aging process can cause various health problems. One of the health problems in the elderly is mental disorders or stress. World Health Organization states that 450 million people are experiencing mental disorders (stress) and there are 10% of the total population in Indonesia experiencing stress (Setiawan & Amalia, 2019). The data collected from Basic Research of Health in 2013 showed that the elderly who experience health issues of the emotional mental disorder has reached 8.34% at the age of 55-64 years old, 10.0% at the age of 65-74 years old, and 12.5% at > 75 years old. The number of events for women is higher, which reached 8.9% compared to men which reached 5.0% (Erwanto & Asmarani, 2019). The research conducted by Anisya (2016) mentioned that the prevalence of old age people who experienced stress in the world is 4.7-16%.

Decreased muscle strength arises because there are changes in body composition, muscles, bones, and joints. Decreases or changes in the muscles will cause functional changes in the muscles. Decreased muscle function and strength cause a decrease in the ability to maintain postural balance or body balance in the elderly (Prasetyo & Indardi, 2015). Researchers from Columbia University Medical Center mentioned the decline in muscle strength in the elderly occurs due to calcium leakage from a protein group in muscle cells called ryanodine which then triggers a series of events that limit muscle fiber contraction. With less available calcium, muscle contractions weaken. Febriani, Wungouw & Marunduh, (2015)

Changes resulting from the aging process usually occur 50 years afterlife, characterized by a decrease in strength of approximately 1.5-5% per year. The highest muscle strength occurs at 30 years aged then decreases slowly by about 30-40% until reaching 80 years of age. Muscular strength is the ability of a muscle to exert maximum contractile force against resistance in a single contraction.6 The aging process changes the pattern of muscle fibers and causes slowing of the time to contract and muscle speed. Another cause of the aging process is a decrease in muscle mass. Muscle mass can decrease by 3-8% per decade after the age of 30 years and after the age of 60 years, the rate of decline will occur more quickly. (Suyanto, Paskaria, & Gunawan, 2021).

A preliminary study on June 5, 2020, found to total 46 of elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali. Six elderly were chosen to be preliminary study respondents. The measurement of muscle strength showed all of them experienced a decrease in leg muscle strength. Two elderly experienced mild stress while the other four people did not experience stress. Based on the above background, the authors are interested in scientifically proving the relationship between muscle strength and stress in the elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali.

2. Method

This research method is nonexperimental quantitative research with an analytical observational method with a crosssectional design. This research was conducted in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali. The data collection time is June 12, 2020. The sample in this study was selected from an affordable population using the total sampling method where the researcher took all of the population used as a sample. The number of samples studied in this study was 46 elderly. The measuring instrument uses the Chair Stand Test instrument to measure muscle strength. Muscle strength is said to be normal if it can be tested for 30 minutes with a minimum number of movements according to table 1 (Hambali & Kusmaedi, 2019). Stress in the elderly was measured using the DASS 42 (Depression, Anxiety, and Stress Scale). Data analysis using Fisher Exact because it does not meet the Chi-Square statistical test requirements.

Result and Discussion 3

Table 2 showed the characteristics of the respondents, including age, gender, occupation, and disease history. Table 2 showed many respondents aged 60-70 years or in the Elderly category are 28 people, or 60.9% of all respondents. There are more female respondents than men. Many respondents do not have a history of the disease, namely 30 people or 65.2%. Most of the respondents were work as farmers.

Table 3 shows that many respondents have more abnormal muscle strength than normal ones. Based on table 3, we can see that many respondents have abnormal muscle strength, namely 33 people or 71.7% of the total number of respondents. Muscular strength is the ability of a muscle group to exert maximum contractile force against resistance in a single contraction. Muscles strength can withstand loads in the form of external loads (external force) and internal loads (internal force). Muscle strength is closely related to the neuromuscular system, namely how much the ability of the nervous system to activate muscles to contract, so that the more muscle fibers are activated, the greater the strength produced by the muscle (Pangemanan, Engka, & Supit, 2013). Muscle mass is one of the important components that can affect muscle strength. If a person has large muscle mass, it will produce large muscle strength, on the contrary, if someone has a small muscle mass it will produce small muscle strength (Schlenker & Gilbert, 2015).

Table 1. Minimum Value for Measurement of Muscle Strength								
Test Name	Sor	Age						
	Sex	60-64	65-69	70-74	75-79	80-84	85-89	90-94
Chair Stand	М	17	16	15	14	13	11	9
Tes	F	15	15	14	13	12	11	9

_ _ _ _ _ _ _ _ _ ____

In line with this research, Febriani, Wungouw & Marunduh, (2015) stated that the decline in muscle strength begins at 40 years of age and the process will accelerate at the age of 75 years. Based on researchers from Columbia University Medical Center, the decline in muscle strength in the elderly occurs due to calcium

leakage from a protein group in muscle cells called ryanodine. They trigger a series of events that limit muscle fiber contraction. It reduces the available calcium then the muscle contractions weaken. The average muscle strength of respondents in the 60-69 year age group has a greater average muscle strength than the 70-79 year, 80-89 year age group, 117

Copyright ©2022, Jurnal Keperawatan Respati Yogyakarta, p-ISSN: 2088-8872; e-ISSN: 2541-2728

and 90 years and over. This is because, with age, muscle strength will decrease

Tabel 2. Frequency Distribution of RespondentsCharacteristics in the Elderly in Banjar Samu,

Singapadu Kaler, Sukawati, Gianyar, Bali						
Characteristic	Frequency	Percentage				
Age						
60-70 (Elderly)	28	60.9				
71-90 (Old)	18	39.1				
Sex						
Male	21	45,7				
Female	25	54,3				
Disease History						
None	30	65.2				
Gout	6	13.0				
Rheumatic	4	8.7				
Others	6	13.0				
Employment						
None	7	15.22				
Farmer	18	39.13				
Trader	6	13.04				
Labour	5	10.87				
Others	10	21.74				
Total	46	100.0				

Table 3. Muscle Strength in the Elderly in BanjarSamu, Singapadu Kaler, Sukawati, Gianyar, Bali.

Muscle Strength	Frequency	Percentage		
Abnormal	33	71.7		
Normal	13	28.3		
Total	46	100.0		

The physical condition of a person is generally not the same as the others, same with the level of muscle strength ability of each person is different. Factors that affect strength are age and gender, muscle size, muscle length and tension, muscle unit recruitment, energy availability and blood flow, and motivation (Farisa, 2017).

In this study, from 46 elderly there were 13 elderly who were able to perform a strength test with normal results. From 13 elderly, there were 8 male elderly and 5 female elderly. It can be said that male muscle strength is greater than female muscle strength. Pinontoan, Marunduh & Wungouw (2015), stated that in general, the male elderly is stronger than the female. It is due to differences in muscle mass. This increase in muscle strength is related to the increase in muscle mass after puberty, after puberty, male muscle mass is 50% greater than female muscle mass. Dion (2005), states that males have stronger muscle strength in the quadriceps and femoris muscles. Chen (2012) in his research found that muscle strength in women is lower than the muscle strength of men.

Table 2 shows ten elderly have a history of rheumatic diseases and gout. Gout and rheumatism caused the elderly to have difficulty moving their bodies due to pain. When they were not moved over time, the joints would stick together and become completely immovable (contractures). The existence of limited movement and reduced use of joints can affect muscle strength, especially the legs which impact the elderly unable to carry out daily activities (Suhendriyo, 2014).

Table 4. Stress Levels in the Elderly in BanjarSamu, Singapadu Kaler, Sukawati, Gianyar, Bali.

Stress	Frequency	Percentage		
Normal	33	71.7		
Mild Stress	13	28.3		
Total	46	100.0		

Table 4 shows that the elderly do not experience stress (normal) than those who experience mild stress. In this study, the highest value of stress experienced by the elderly based on the DASS (Depression Anxiety Stress Scale) questionnaire was 17, where the value of 17 was categorized as mild stress. While the biggest symptom of the DASS indicator experienced by the elderly is that the elderly become impatient when experiencing delays (for example traffic jams and waiting for something).

The results of this study are in line with Koampa (2015), which states that research on elderly parents in the village of Tombasian Atas, Kawangkoan District, most elderly parents experience mild stress, of the 60 elderly respondents as many as 46 (76.7%) of the elderly experience mild stress. Kaunang (2019) showed the same thing, as many as 47 (92,2%) of the elderly experienced mild physical stress.

Stress is any situation in which nonspecific demands require an individual to respond or take action. Stress requires both coping and adaptation. The general adaptation syndrome of Selve's theory describes stress as the damage that occurs to the body regardless of whether the cause of the stress is negative or positive. The body's response can be predicted regardless of the particular stressor or cause. The factors that cause stress are biological conditions, psychological conditions, and socio-cultural conditions. The characteristics of mild stress are the spirit of working great, excessive (overacting). "Sharp" vision is not what it used to be. Feeling able to complete work more than usual, but without realizing it, energy reserves are running low (Potter & Perry, 2005).

In this study, many elderly experienced normal stress conditions. Individuals can deal with stress by using or taking either sources of coping;

118

social, personal, or intrapersonal. There are two types of coping mechanisms. Both they are taskoriented reactions and ego-oriented reactions. The Task-oriented reactions are overcome when people deal with the reality of stress demands. They assess objectively to solve the problem, recover conflicts, and fulfilling their need. Meanwhile, ego-oriented reactions are often used to protect, so they are called ego defence mechanisms (Kamengbila, Asda, & Pratama, 2016).

The results show that most of the elderly are still working. While working, the elderly can

meet the elderly with the community (friends, customers, and others). Social support is a condition that is beneficial for individuals obtained from other people who can be trusted so that people know that there are other people who pay attention, respect, and love them (Permana, 2013). Muizzulhafiidh (2019) mentions that social support makes the elderly feel like they have friends to tell each other. In common and mutually reinforcing so that the elderly can gain a sense of comfort, security, and identity.

 Tabel 5. Relationship between muscle strength and stress in the elderly in Banjar Samu, Singapadu Kaler,

 Sukawati Gianyar Bali

		Stres			Total		Sig
Muscle	Normal		Mild		-		
Strength	F	%	F	%	F	%	
Abnormal	20	60.6	13	39.4	33	100.0	0.009
Normal	13	100.0	0	0.0	13	100.0	
Total	33		13		46	100.0	

Table 5 shows the results of the analytical test using Fisher Exact. The value is 0.009. So it can be concluded that there is a significant relationship between muscle strength and stress in the elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar Bali. The elderly whose muscle strength is abnormal then the elderly tend to experience stress. In line with Prasetyo & Indari (2015), the stress in some elderly can arise because the elderly have changes in body composition, muscles, bones, and joints. Decreases or changes in the muscles will cause functional changes in the muscles. Decreased muscle function and strength will result in the lack of ability to maintain postural balance or body balance in the elderly.

The Elderly will have gradual physical and psychological decline. It can cause stress in some of the elderly. Psychosocial problems in the elderly can be in the form of stress, anxiety, and depression. These problems can come from several aspects. They are physical, psychological, and social changes aspects. Symptoms seen in the elderly can be emotionally unstable, irritable, easy to feel harassed, disappointed, unhappy, feeling lost, and feeling useless (Kaunang, 2019)

Asti, Yanti, & Astuti (2017), stated that sports activities, which are followed regularly by the elderly, can provide benefits in the formation of better mood conditions so that the elderly will always feel comfortable. A comfortable feeling condition makes a person able to optimize mental processes function and also affects the individual's ability to deal with stressors. Elderly activities are also a place for the elderly able to gather with peers to create social support for the elderly to share and relieve stress. Therefore, the elderly that are involved in an activity together with others continuously can play a role in the state of individual stress levels even though there are still other influencing factors.

In this study, The elderly with abnormal muscle strength experienced no stress as many as 20 (60.6%) elderly. The elderly experienced mild stress level with abnormal muscle strength is 13 (39.4%) elderly. The elderly who experience a decrease in muscle strength will not always experience stress because most of the elderly already know that when entering old age, they will certainly experience a decrease in muscle strength and they are not too concerned about the decrease in muscle strength experienced. Artini & Rahayu (2014) stated in their research that most of the coping mechanisms are constructive due to family support and being active in community activities. Permana, Sumarwati, & Rosyadi (2009), stated that decreased movement function is considered not a threatening problem for the elderly because it is considered normal along with the aging process.

4. Conclusion

Scientifically there is a relationship between muscle strength and stress in the elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali.

5. Recommendations

Based on the results of this study, The Family with the elderly in Banjar Samu, Singapadu Kaler, Sukawati, Gianyar, Bali, should be able to train the muscle strength of the elderly. Family can help the elderly to prevent a decrease in muscle strength, so the elderly will not experience stress. Community Nurses can create programs related to increasing muscle strength in the elderly such as gymnastics, which aims to train the muscle strength of the elderly so that the elderly do not experience stress. The program can be elaborate with Posyandu Lansia. The next researcher can develop their research by examining other variables that affect stress in the elderly such as biological, psychological, and socio-cultural conditions, and also examining other variables that can affect muscle strength.

6. Acknowledmets

The author gratefully acknowledge University Respati of Yogyakarta and clients who participate in this study

7. References

- Anisya, A. (2016). Hubungan Stress Dengan Kejadian Insomnia pada Lansia di Panti Sosial Sahai Nam Aluih Sincin. Universitas Andalas.
- Artini, B., & Retnayu, M. N. (2014). MEKANISME KOPING LANSIA DALAM MENGHADAPI MASA PENSIUN. Jurnal Keperawatan, 3(2), 5-Pages.
- Asti, N. P. I. P., Yanti, N. L. P. E., & Astuti, I. W. (2017). Hubungan kekuatan otot dan tingkat stres dengan risiko jatuh pada lansia. 4(2), 41–46
- Chen, G., Liu, L. I. U., & Yu, J. (2012). A comparative study on strength between American college male and female students in Caucasian and Asian populations. Sport Science Review, 21(3-4), 153.
- Cicih, L. H. M. (2019). INFO DEMOGRAFI (1st ed., Vol. 1). LD-FE Universitas Indonesia.
- Dion S, S. (2005). Gambaran Nilai 1 RM (Repetisi Maksimum) Otot Kuadriseps Femoris Pada Subyek Sehat Berumur 18-25 Tahun (Doctoral dissertation, Program Pascasarjana Universitas Diponegoro).
- Erwanto, R., & Asmarani, F. L. (2019). The Progressive Muscle Relaxation and Deep Breathing as Effective Procedures in Reducing the Stress Levels on Older People. Jurnal Ners dan Kebidanan Indonesia, 6(1), 42-48.
- Farisa, D. (2017). Evaluasi Kekuatan Otot Lengan Petani Kelapa Sawit Kecamatan Simpang Kanan Kabupaten Aceh Singkil. JurnalIlmiahMahasiswa PendidikanJasmani, Kesehatan DanRekreasiFakultas Keguruan DanIlmu Pendidikan Unsyiah, 3(4), 105–115.
- Febriani, P., Wungouw, H. I. S., & Marunduh, S. (2015). Pengaruh Latihan Beban Terhadap Kekuatan Otot Lansia. Jurnal E-Biomedik, 3(1). https://doi.org/10.35790/ebm.3.1.2015.807

https://doi.org/10.35790/ebm.3.1.2015.807 5

- Hambali, R. M., & Kusmaedi, N. (2019). Tingkat Kebugaran Jasmani Lansia Dikaji Berdasarkan Tingkat Partisipasi dan Gender. 5(2).
- Kamengbila, F. A., Asda, P., & Pratama, A. B. (2016). Hubungan mekanisme koping dengan tingkat stres pada lansia pensiunan di RW. 04 Tambakbayan Caturtunggal Depok Sleman Yogyakarta tahun 2014. MIKKI (Majalah Ilmu Keperawatan dan Kesehatan Indonesia), 4(1).
- Kaunang, V. D., Buanasari, A., & Kallo, V. (2019). Gambaran Tingkat Stres Pada Lansia. Jurnal Keperawatan, 7(2).
- Koampa, M. M., Bidjuni, H., & Onibala, F. (2015). Hubungan Antara Tingkat Stres Dengan Kemandirian Pada Orang Tua Lanjut Usia Di Desa Tombasian Atas Kecamatan Kawangkoan Barat. 151, 10–17. https://doi.org/10.1145/3132847.3132886
- Kusumawardani, D., & Andanawarih, P. (2018). Peran Posyandu Lansia Terhadap Kesehatan Lansia Di Perumahan Bina Griya Indah Kota Pekalongan Dian. 7(Dm), 273–277.
- Muizzulhafiidh, A. (2019). Hubungan Dukungan Sosial Teman Sebaya Dengan Tingkat Stres Pada Lansia Di Unit Pelaksana Teknis Pelayanan Sosial Tresna Werdha Kabupaten Jember.
- Pangemanan, D. H. C., 3x2Engka, J. N. A., & Supit, S. (2013). Gambaran Kekuatan Otot Dan Fleksibilitas Sendi Ekstremitas Atas Dan Ekstremitas Bawah Pada Siswa/I Smkn 3 Manado. Jurnal Biomedik (Jbm), 4(3), 109–118. https://doi.org/10.35790/jbm.4.3.2012.121
- Permana, C. A. (2013). Hubungan dukungan sosial keluarga dengan tingkat stres pada lansia andropause di Gebang wilayah kerja Puskesmas Patrang Kabupaten Jember.
- Permana, F. H., Sumarwati, M., & Rosyadi, I. (2009). Hubungan Penurunan Fungsi Gerak Lansia terhadap Strategi Koping Stres Lansia di Panti Jompo Welas Asih Kec. Singaparna Kab. Tasikmalaya. Jurnal Keperawatan Soedirman, 4(3), 125-130.
- Pinontoan, P. M., Marunduh, S. R., & Wungouw, H. I. (2015). Gambaran kekuatan otot pada lansia di bplu senja cerah paniki bawah. e-Biomedik, 3(1).
- Potter & Perry. (2005). Buku Ajar Fundamental Keperawatan. Jakarta: EGC.
- Prasetyo, A., & Indardi, N. (2015). Peningkatan Keseimbangan Postural Menggunakan Pengukuran Berg Balance Scale (Bbs) Pada Lansia Di Sasana Panti Mulyo Sragen.

120

Available on: http://nursingjurnal.respati.ac.id/index.php/JKRY/index Jurnal Keperawatan Respati Yogyakarta, 9(2), May 2022, 116 – 121

Journal of Sport Sciences and Fitness, 4(1), 28–31.

- Schlenker, E., dan Gilbert, J. Essentials of nutrition and diet therapy. Riverport Lane: Elsevier; 2015. h.122
- Setiawan, H., & Amalia, N. (2019). Hubungan Antara Lingkungan Sosial Dengan Tingkat Stres Pada Lansia Di UPTD Panti Sosial Tresna Werdha Nirwana Puri Samarinda. 290–294.
- Suhariyanto. (2019). Badan Pusat Statistik. In Statistik Penduduk Lanjut Usia.

https://doi.org/10.1017/CBO97811074153 24.004

- Suhendriyo, S. (2014). Pengaruh Senam Rematik Terhadap Pengurangan Rasa Nyeri Pada Penderita Osteoartritis Lutut Di Karangasem Surakarta. Interest: Jurnal Ilmu Kesehatan, 3(1).
- Suyanto, D. H., Paskaria, C., & Gunawan, D. (2021). Perbandingan kekuatan otot dan massa otot antara wanita lansia aktif dan tidak aktif berolahraga. JURNAL ILMU FAAL OLAHRAGA INDONESIA, 4(1), 9-13.